PCT WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 5 : G06F 15/00 — A1

(11) International Publication Number: WO 94/00817

(43) International Publication Date: 6 January 1994 (06.01.94)

(21) International Application Number: PCT/US93/06104

(22) International Filing Date: 18 June 1993 (18.06.93)

(30) Priority data:
901,642 — 22 June 1992 (22.06.92) — US

(71) Applicant: HEALTH RISK MANAGEMENT, INC. [US/US]; 8000 78th Street, Minneapolis, MN 55439 (US).

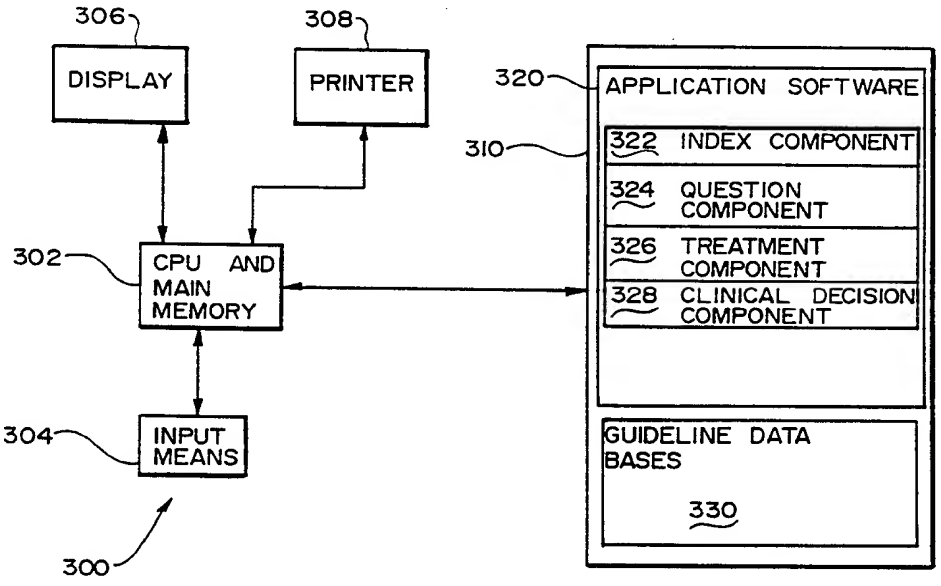
(72) Inventors: MCILROY, Gary, Thomas ; 4706 Sunnyside Road, Edina, MN 55424 (US). KEES, Julie, Ellen ; 1031 Briar Creek Road, Eagan, MN 55123 (US). KALSCHEUER, Jacquelyn, Ann ; 8736 5th Avenue South, Bloomington, MN 55420 (US).

(74) Agents: HEMPHILL, Stuart, R. et al.; Dorsey & Whitney, Pillsbury Center South, 220 South Sixth Street, Minneapolis, MN 55402 (US).

(81) Designated States: AT, AU, BB, BG, BR, CA, CH, CZ, DE, DK, ES, FI, GB, HU, JP, KP, KR, KZ, LK, LU, MG, MN, MW, NL, NO, NZ, PL, PT, RO, RU, SD, SE, SK, UA, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).

Published
With international search report.

(54) Title: HEALTH CARE MANAGEMENT SYSTEM



(57) Abstract

A health care management system for use by hospitals, physicians, insurance companies, health maintenance organizations, and others in the health care field includes a processing unit (302) and health condition guidelines. A user imputs information (304) related to the health condition of an individual and guideline-recommended treatments are identified. The user also inputs (304) actual or proposed treatments for the same individual. The resulting comparative information can be used to modify the actual or proposed treatment, or provide explanatory information as to reasons for the difference between actual/proposed and guideline recommended treatment. Also, the comparative information can be used by a reviewer for evaluation or utilization purposes.

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AT	Austria	**FR**	France	**MR**	Mauritania
AU	Australia	**GA**	Gabon	**MW**	Malawi
BB	Barbados	**GB**	United Kingdom	**NE**	Niger
BE	Belgium	**GN**	Guinea	**NL**	Netherlands
BF	Burkina Faso	**GR**	Greece	**NO**	Norway
BG	Bulgaria	**HU**	Hungary	**NZ**	New Zealand
BJ	Benin	**IE**	Ireland	**PL**	Poland
BR	Brazil	**IT**	Italy	**PT**	Portugal
BY	Belarus	**JP**	Japan	**RO**	Romania
CA	Canada	**KP**	Democratic People's Republic of Korea	**RU**	Russian Federation
CF	Central African Republic			**SD**	Sudan
CG	Congo	**KR**	Republic of Korea	**SE**	Sweden
CH	Switzerland	**KZ**	Kazakhstan	**SI**	Slovenia
CI	Côte d'Ivoire	**LI**	Liechtenstein	**SK**	Slovak Republic
CM	Cameroon	**LK**	Sri Lanka	**SN**	Senegal
CN	China	**LU**	Luxembourg	**TD**	Chad
CS	Czechoslovakia	**LV**	Latvia	**TG**	Togo
CZ	Czech Republic	**MC**	Monaco	**UA**	Ukraine
DE	Germany	**MG**	Madagascar	**US**	United States of America
DK	Denmark	**ML**	Mali	**UZ**	Uzbekistan
ES	Spain	**MN**	Mongolia	**VN**	Viet Nam
FI	Finland				

HEALTH CARE MANAGEMENT SYSTEM

BACKGROUND OF THE INVENTION

The present invention pertains to the field of data processing systems for health care management. More specifically, the present invention pertains to a health care management data processing system for use by hospitals, physicians, insurance companies, health maintenance organizations (HMO's), and others in the health care field to serve as a diagnostic, evaluation, and utilization tool for health care provided to individuals. The system is implemented in computer hardware and software.

Due to the increasing complexity and cost of providing health care, there is an ever increasing emphasis on managing the health care process. The process extends from an individual presenting a health concern to a health care provider and continues through diagnosis, therapeutic selection, resource selection, treatment, and follow-up. This process could be extended further to include proactively identifying or preventing health concerns and planning for anticipated resource needs at one end of the process, and daily nursing management and disability management at the other end of the process.

Previous efforts to manage health care included manual-historical systems where individual files recording actual treatment provided were manually reviewed to collect statistics on general categories of care or to

review the appropriateness of treatment in a given case. Such methods are labor-intensive and inefficient. Efforts have been made to standardize data collection forms, descriptions of conditions, descriptions of treatment, and treatments in order to more efficiently collect and evaluate health care data. Other efforts have been made to automate the analysis of historical health care data for persons with particular health care conditions. These efforts focus mainly on collecting financial data and serve accounting and administrative functions.

At least one known automated prior art health care management system addresses therapeutic selection by starting with a selected treatment and, based on patient information provided by the user, evaluating whether or not that treatment is appropriate. See "Guideline-based Utilization Management Program", Benefits Quarterly (4th Quarter 1991) These systems do not develop a recommended treatment based on various data describing an individual's health condition; the user must first select a predefined treatment. Also, these systems do not have the flexibility to modify or add treatments based on an individual's changing health condition. Further, these systems do not have an integral component whereby explanatory information is elicited from the health care provider or reviewer to facilitate analysis of the difference between actual or proposed treatment and recommended treatment.

It would be a decided improvement over the prior art to have a health care management data processing system that could be used by various health care participants, including doctors, nurses, health care administrators, payor administrators, employers, and evaluators at multiple stages of the health care process. It would be a further improvement for such a system to collect information on individuals having a health concern, to guide the user to a recommended treatment based on the information collected and to compare an actual or proposed treatment with the recommended treatment. The prior art systems also leave an unsatisfied need for explanatory information on differences between the actual/proposed treatment and a recommended treatment

and for obtaining sytematic reviewer input as to any differences between the actual/proposed treatment and a recommended treatment.

It would be a further improvement over the prior art for such a system to permit continuous updating and modification of the experience base, using the information inputed into the process for each case. For example, the information on actual treatment provided can be used to reassess the decision path for recommended treatments.

A system implementing the above process should ideally have several qualities. It should be cost-effective, i.e., lead to reducing the total cost of health care. It should be usable in real-time, i.e., the information input into the system should be immediately processed and available for further use. It should be interactive, allowing a variety of health care participants (doctors, nurses, administrators, quality evaluators) to understand and effectively use the system. It should be flexible enough to adapt to changes in and evolution of health care professional knowledge and health care treatment methods.

A health care management data processing system designed to manage the health care process, using a data base of health care records and health condition guidelines, that includes providing diagnosis, evaluation, and utilization information, would be a decided improvement over the prior art.

SUMMARY OF THE INVENTION

To overcome these and other problems in the prior art, the present invention provides a health care management data processing system that is a real-time, interactive system to manage the health care process described above. The system can be used by hospitals, physicians, insurance companies, HMO's, and others in the health care field to promote cost-effective health care.

The present invention builds from a data base of treatment guidelines developed by medical professionals and provides a diagnosis-based system that can be used during various steps of the clinical decision process: (1) prospectively, before treatment, when an individual presents a

health concern; (2) concurrently, at any stage of existing treatment; and (3) retrospectively, after treatment has been provided. The treatment guidelines are structured to work with an interactive question and answer methodology that ensures that the most appropriate data are collected and guides the user through the complex medical evaluation process. This is done by presenting questions in a logically-structured order, leading to guideline-recommended treatment. The information retained by the system allows for a consistent, efficient review process. Variances between actual or proposed and guideline-recommended treatment can be used for quality assurance and audit purposes. Also, cross-specialty review is facilitated.

According to the present invention, there is provided a processing unit and software-implemented health condition treatment guidelines. A user inputs an individual's health data into a new or existing case file in response to inquiries implemented in a health-condition specific guideline. Through the interactive guideline query-response process, a guideline-recommended treatment (or treatments) is obtained. The user may adopt or accept the guideline-recommended treatment or input an actual or proposed treatment that is different. Discrepancies between actual/proposed and guideline-recommended treatment are identified and the user's choice is documented through interactive queries. Once a treatment is selected, the case information is added to the data base and an additional reviewer can analyze the file. The case may be re-opened, and changes may be made at any stage in the process to reflect new conditions, or new or modified treatments.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a block diagram of the system of the present invention.

Figure 2 is an excerpt from a medical category index to the guideline data base.

Figure 3 is an excerpt from a diagnosis code-based index to guidelines.

Figure 4 is an excerpt from the guideline data base, showing a guideline question and navigation structure.

Figure 5 is another excerpt from the guideline data base, showing another guideline question and navigation structure, illustrating a path to a different guideline.

Figure 6 is another excerpt from the guideline data base, showing a guideline question and navigation structure, illustrating how a previously selected answer can join with a current answer to identify the next step.

Figure 7 is an example of a guideline recommendation data base item.

Figure 8 is an excerpt from the guideline procedure file.

Figure 9a is a flow chart of the guideline development process.

Figure 9b is a flow chart of the clinical decision process.

Figure 10 shows the medical category screen menu used to access the guidelines.

Figure 11 shows a screen listing of titles some of the guidelines for selected medical conditions within the cardiovascular/respiratory medical category.

Figure 12a shows a screen used to access guidelines by diagnosis code.

Figure 12b shows a screen used to access guidelines by treatment text.

Figure 13 shows a screen used to open a guideline process after guideline selection.

Figure 14 shows a screen with examples of the question/answer process for utilizing the guideline for the diagnosis of thrombophlebitis.

Figure 15 shows a screen identifying guideline recommended treatment for a thrombophlebitis case, overlaid with a specialty review box.

Figure 16 shows a screen identifying guideline recommended treatment, proposed treatments, and final recommendation treatment for a thrombophlebitis case.

Figure 17 shows a screen used for specialist's review of a case exhibiting variances between proposed and final recommended treatment.

Figure 18 is a flow chart of the guideline for treatment of thrombophlebitis.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

A. Hardware/Software System Overview

The present system is shown in general block-diagram form in Figure 1. As seen there, the system 300 comprises a processing unit or CPU with main memory 302; input means 304, such as a keyboard connected to the CPU/main memory 302; and two output devices, a display 306 (such as a CRT or other screen device) and a printer 308, also connected to CPU/main memory. Storage device 310 (e.g., a disk drive) communicates with the CPU/main memory 302 and is the memory unit for storing application software 320 and guideline data bases 330. The system 300 also includes appropriate operating system software (not shown).

The preferred implementation platform of the present invention is a system implemented on an IBM compatible personal computer having at least four megabytes of main memory and an eighty megabyte hard disk drive, with Microsoft Windows as the user interface and Paradox as the data base management software. Individual personal computers can be networked to give multiple users access to a common data base. The application software 320 is written in Microsoft C development language. The application software 320 functions as an interactive presentation tool, permitting the user to interactively exchange information with the system 300. Certain session data are recorded to allow case audit and analysis of system use.

At the foundation of the system 300 is a set of diagnosis-based guidelines that are derived from medical professional and healthcare management expertise. Each guideline is associated with a particular health care condition for which treatment exists. Each guideline is intended to lead a system user through a sequence of interactive data-collection queries based on the specified health care condition observed in

an individual patient. The data-collection queries are logically structured so that the guidelines user identifies pertinent patient characteristics and is led to an endpoint that is usually one recommended treatment. However, the endpoint may also be two or more alternative treatments, a pointer to a different guideline or a recommendation for further clinical evaluation before treatment is selected.

As implemented in the system 300, a guideline can be viewed as a decision tree with multiple data collection nodes, most of which have conditional branching to connected nodes based on user-supplied data. The endpoints of navigation through the decision tree are usually embodied in a set of recommended treatments. The path to any recommended treatment involves one or more conditional branches. Thus, each guideline implemented in the system 300 has a definite algorithmic structure that guides the user. The structure and content of and process for development of guidelines are discussed in greater detail below.

The system 300 presents each guideline in a questioning logic sequence where the response to each question drives to the next question or to the appropriate treatment option(s). As defined in the present invention, a treatment option includes an intervention and the corresponding primary health care resources utilized in that intervention. The data for implementing a guideline include, in addition to question text, the presentation parameters, such as the presentation order for the questions, and the conditional branching logic that is driven by the user's responses to the guideline questions. With each guideline implemented as a set of data base parameters, the application software is designed as a shell used to access and present the guideline content and control the navigation through the questioning process.

Once the user reaches one or more guideline-recomended treatment options, the system 300 elicits from the user information identifying the actual treatment already given or, preferably, the treatment proposed for the individual that presented the health care condition. The

system 300 compares the actual or proposed treatment against the guideline-recommended treatment option(s). This comparison addresses not only the intervention or procedure that is central to each treatment option but also the several health care resource parameters that are part of each recommended treatment option (and are discussed in greater detail below). The system 300 develops a treatment evaluation report based on the comparison to identify discrepancies between the guideline-recommended treatment and the actual or proposed treatment.

There are four general components to the application software 320: (1) an index component that facilitates quick access to the correct guideline; (2) a question component that presents the questions and controls navigation through the guideline based on the user's responses; (3) a treatment component that presents the guideline-defined treatment options, and highlights the appropriate option based on user responses to questions; and (4) the clinical decision component that facilitates the collection of data to support analysis of the use and impact of the guidelines and the tracking of guideline activity by case.

The index component utilizes several different data bases. The main index data base, a portion of which is shown in Figure 2, includes: a field 10 with two digit numbers that identify one or more medical categories; a field 11 containing a textual description for each medical category; a field 12 containing two digit numbers each of which identifies one of multiple guidelines within a medical category; a field 13 for a guideline extension identifier, signifying that certain guidelines are an extension of other guidelines; and a field 14 containing textual description for each guideline. Therefore, each guideline can be identified by a five digit number: a two digit medical category number, a two digit guideline number, and a one character extension identifier (optional). For example, the Thrombophlebitis; Extension guideline 15 is identified as 53(23X).

The diagnosis code index, a portion of which is shown in Figure 3, cross-references each guideline number in field 16 with one or more

diagnosis codes in field 17. This data base is an index used to identify a guideline based on a diagnosis code entered by the user.

The question component also has a data base. Figure 4 shows a portion of the question and navigation data base. For each guideline identified by numbers in field 18, there are one or more questions, each identified by number and text in field 19. Associated with each question in one or more of columns 20, 21, 22 is coded navigation information identifying the next step, which may be an additional question, a different guideline or a treatment. Different paths through the guideline are indicated by codes representing each possible answer provided by the user. A two digit code in column 20 or 21, such as the "02" at 23a, identifies the next question to be answered. Two characters, at least one of which is a letter, such as the "4A" at 23b, identifies a treatment. Column 20 shows the code for the next step when the user response to a question is "Pass" (or "yes"). Column 21 shows the code for the next step when the user response to a question is "Fail" (or "no"). Column 22 contains information identifying a preceding question and its responses, if the path from a question depends on the user responses to both the current and a preceding question. (An example of this appears in Figure 6 and is explained below.) Figure 5 shows another exemplary portion of the question and navigation data base. As shown in Figure 5, a four digit code 24 in column 20 (or 21) identifies when another guideline should be applied as the next step.

In implementing a guideline, the question/answer combinations are sequenced to yield the most efficient route to a treatment. Also, the question/answer combinations are sequenced based on frequency of use, listing the most common questions first. This sequencing scheme makes the present invention more efficient in moving the user directly to the recommended treatment and collecting only relevant information.

Figure 6, which shows a further exemplary portion of the question and navigation data base, provides an example in which the answer to a preceding question together with the answer to the current question

defines the next step. Question/answer 04g under guideline 53(03) is illustrative. Under the column 22, labeled "Frm", it is shown that question/answer 04g could have been reached by previously answering question 02 as Pass (code "02P") or by selecting any of answers "a" through "f" to question 03 (codes "03a" to "03f"). If 02P or 03a through 03e were chosen as the previous answer and response "g" is selected for question 04, then in each case the next step is the treatment options of "2A" or "2C". However, if response "g" were selected to question 04 after the answer corresponding to code "03f" was selected, then the next step is "PR," indicating physician review.

The treatment component also uses data bases. Figure 7 is an example of a guideline recommendation data base set for the condition corresponding to guideline 53(23). In general, for each guideline identified by a five digit number in field 25, there are listed one or more recomended treatments. Each treatment is identified by: a two character treatment code in field 26, a textual treatment description in field 27, and several resource utilization indicators in columns 28-32, labelled Setting, A/S, LOS , Preop LOS, and Flag, respectively. (These resource utilization indicators are explained in greater detail below.) Also, a numeric procedure code, such as a Current Procedure Terminology (CPT) code is provided in field 33.

A complete menu of all treatments that may be referenced in any guideline, including treatment descriptions and resource indicators, is retained in a procedure file that is used by all guidelines. The procedure file, an excerpt of which is shown in Figure 8, lists the numeric procedure code in field 34, the five resource utilization indicators in fields 35-39, and numeric procedure description text in field 41. A count of the number of text lines in the numeric procedure description is kept in field 40.

The clinical decision data collection component is linked to the previous three components to collect data and track guideline activity. Its purpose is to provide a foundation for moving from the individual cases

processed in the system to aggregated statistics for a set of cases. The reports facilitated by this component are discussed below.

B. Description of a Diagnosis-Based Guideline

Diagnosis-based guidelines provide a framework to reflect the critical factors in the clinical decision process usually leading to treatment, to define optimal resource allocation, and to outline key patient data. A guideline is not a fixed formula or cookbook, although it must be a definite step by step algorithm that can be coded; rather, a guideline presents a disciplined framework or process to guide and assist the user, such as a health care provider, in identifying appropriate treatment.

Application of a guideline to an individual's health condition in the present system 300 consists of four phases: (1) the entry phase; (2) the question/data collection phase; (3) the assessment phase; and (4) the final recommendation phase. In the entry phase, the guideline to be applied is identified. Generally, a guideline is identified by a recognized health condition description, which may be stated as a symptom or a diagnosis.

Once the desired guideline is identified among those available in the system, the question/data collection phase begins and the user is presented with a series of questions. The guideline questions are organized in a format similar to a decision tree or flow chart. Generally, the next question is identified based on the answer to the current question. However, some questions elements may be designed only to elicit information and the answer does not (at least immediately) influence the next question presented. The number of questions presented in a given case varies with the guideline selected and the answers to the questions presented.

In the third phase, the guideline identifies a recommended treatment or other action, based on the user's answers to the questions presented. As noted previously and shown in Figures 7 and 8, a recommended treatment consists of a textual description, a numeric procedure code, and resource utilization indicators.

There are a five resource utilization indicators. "Setting" identifies whether the treatment occurs in an inpatient facility (IP), outpatient facility (OP), or physician office (OF). "LOS" (Length of Stay) identifies the number of days for inpatient facilities. "A/S" (Assistant Surgeon) designates whether an assistant surgeon is required. "Preop LOS" (Preoperative Length of Stay) designates the number of inpatient days required prior to elective surgery. "Flag" indicates special considerations such as large case management, physician review, or coordination of services.

More than one recommended treatment may be provided as the outcome of a guideline. Also, a treatment may not be provided; rather, application of a new guideline or further clinical evaluation can be recommended.

As noted above, a guideline is not a fixed formula that, in effect, requires the user to pursue a given treatment. To the contrary, use of a guideline in the present system 300, specifically contemplates that the user may select and enter into the system a proposed or actual treatment that is not the recommended treatment indicated by the guideline. If the user selects a proposed or actual treatment that is not the recommended treatment indicated by the guideline, then the system calls for specialty review of the case. This usually involves seeking the opinion of a person different from the person that selected the proposed or actual treatment. Once the specialty review is completed, the user enters into the system a final recommendation treatment. This can be the guideline recommended treatment, the proposed or actual treatment previously entered by the user, or a different treatment resulting from the specialty review.

A primary purpose of the guidelines is to initiate and facilitate comparison and evaluation, if there is a difference between the the final recommendation treatment and guideline recommended treatment or between the final recommendation treatment and proposed/actual treatment. This comparison and evaluation occurs in the fourth phase. If

there is a difference between the the final recommendation treatment and guideline recommended treatment, the system 300 elecits an explanation for each variance in the intervention or procedure, as well as in resource utilization indicators (provided that the differences in the intervention or procedure permits meaningful comparisions). If there is a difference between the the final recommendation treatment and proposed/actual treatment, e.g., the user is overriding the proposed/actual treatment of a provider, the system 300 elicits comments on the influence of the guideline process on the final recommendation, i.e., the manner in which care changed as a result of the guideline process.

The content of a guideline requires that it reflect accepted clinical practice when formulated and also requires (a) ongoing evaluation to ensure appropriateness and (b) assessment of its implementation to ensure consistent application and appropriate sensitivity and specificity of its contents. The clinical content of each guideline needs to be based on available evidence and refined by result of application. Thus, guidelines are developed first as paper diagnosis and treatment models by health care professionals and these models are refined to sufficient definiteness to permit their coding.

Figure 9a is a chart outlining the guideline development process. At step 1 the illness category that the guideline will cover is identified. This decision is usually based on existing patterns, such as the volume of cases for an illness category, the extent of variations in treating an illness, or cost for treating an illness. A panel of people with expertise in the selected illness category or in research procedures is established.

At step 2, the scope, i.e., components of care, of the guideline is identified. The five major components that a guideline may include are diagnostic guideline, therapeutic selection, resource selection and acute care management. The care components decision is based on the purposes for developing the guideline, understanding how it would be implemented, and the financial resources available for guideline development.

At step 3, any subclassifications used to identify severity levels of the illness with a set of treatment options are identified. The subclassifications should be standard groupings whenever possible, so they will be consistent with data used in future analyses.

At step 4, an evidence chart that defines aspects of the diagnosis or treatment which require specific scientific support or evidence is developed. This evidence is necessary to determine the impact on expected clinical outcomes of a specific intervention. It also describes potential adverse affects or outcomes and complications which will need to be considered in evaluating overall risks and benefits.

At step 5, a literature search is conducted. Prior to conducting the literature search it is important to define the search logic, process, and list of exclusions in order to efficiently expend time and resources. The evidence chart helps organize the information to complete the literature search.

At step 6, evidence retrieved for each linkage of the evidence chart is documented in a standard format. The data abstraction process is completed. The results are summarized to specifically document the results of each study.

At step 7, quantitative analysis is used to draw conclusions about a particular intervention's effectiveness. Narrative summaries are created of the information for each intervention, describing the impact on expected outcome. This synthesis of information, including the narrative summary, is provided to knowledge experts for a decision of clinical impact of intervention on expected outcome.

At step 8, a summary of the risks and benefits of interventions appropriate to a diagnosis is generated. This summary may include positive outcome, grade of impact, contraindication, adverse affect/mortality, adverse affect/morbidity, disability, discomfort and cost impact. At this point a meeting of the expert panel occurs. During this meeting the risk summary benefit is reviewed, resource selection, key

management and follow-up guidelines are defined, and consensus on the guideline is reached.

At step 9, a clinical appropriateness model is created by the panel that describes by intervention: patient characteristics for which the intervention is indicated and contraindications, with appropriate alternative when present. This information is then aggregated into a guideline.

At step 10, for each intervention adopted into the guideline, the panel determines a minimum level of resource required to administer the treatment. This includes evaluating the setting and potential variables.

At step 11, acute care management is defined. For each intervention requiring an inpatient stay, the panel determines the appropriate length of stay.

At step 12, following completion of a guideline, the panel develops guidelines for extended care, which include the indications, treatments and related resources.

At step 13, the panel meets to review the entire guideline for clarity and accuracy. Panel members vote formally for adoption of each guideline.

Guidelines are continuously updated by recurring searches by diagnosis for new findings and studies. Also each guideline can be reviewed on a periodic basis, such as annually. Information from the care management system can be retrieved for that review, including results of use, frequency of use, frequency of variation by component, type of variations.

C. Using the System

Figure 9b shows the basic steps of the clinical decision process in which the present invention may be used. Initially, an individual presents a health condition to a provider. Next, the diagnosis process is initiated. The health care provider collects information from the individual and performs tests or other procedures. At this point, the system user (whether it is the provider, assistant, administrator, or other)

may initiate the guideline process leading to a recommended treatment. Also at this point, the user may input an actual or proposed treatment prior to initiating the guideline process.

Broadly viewed in terms of the clinical decision model of Fig. 9b, the system 300 can be used to aid diagnostic confirmation and therapeutic selection associated with the diagnosis. The system 300 can also aid resource selection, because the guidelines used in the system contain resource recommendation parameters. Thus, the guidelines address both the problem of overutilization and its resulting direct costs and underutilization, which usually leads to indirect costs. Using the system in real-time to guide proposed care provides a clinically-sound basis for ongoing quality and outcomes analysis through tracking a specific diagnosis. Potentially inappropriate or less-than-optimal care can be identifed and corrected. The guideline structure provides a basis for consistent decision-making, while allowing flexibility for complex cases requiring care coordination and intensive review.

To illustrate how the system 300 aids diagnostic confirmation, therapeutic selection and resource selection, it is useful to trace the actual process followed by a system user, including the screens presented.

1. Initiating a Guideline Process - Accessing the Desired Guideline

Access to the appropriate guideline in a real time mode is a key feature of the present invention. Therefore, the index component is structured to allow the user a method of locating the appropriate guideline with differing levels of information. For example, the guidelines are diagnosis-based (that is, they address a specified health condition that has been recognized), but the user (clinical reviewer) may only know the procedure being proposed. This requires an efficient search of all of the guidelines that contain that procedure in order to identify the correct guideline for review of the case.

There are three ways the user may initiate the guideline process. First, the user may select one category from an alpha index of predefined medical categories, as shown in the screen depicted in Figure 10. Each

category leads to an alpha index of guideline titles within that, each title representing a health condition or diagnosis, as shown in Figure 11. This facilitates quick access to the desired guideline. More than one description may exist for a guideline. To actually select a guideline, the user first selects one category from a medical category list 42 as shown in Figure 10. For each selected medical category, the system 300 next presents a menu of guideline titles 43 as shown in Figure 11. The user then selects the desired guideline 44 which is highlighted as shown in Figure 11.

The guideline process may also be initiated a second way. Once a medical category is selected, the user may move to a screen for inputing a predefined diagnosis code, as shown in Figure 12a. For example, in the preferred embodiment, a code from the International Classification of Diseases, 9th Revision, Clinical Modification, or ICD-9-CM, a standard coding system, may be entered in field 45. One guideline may cover a range of diagnosis codes and a diagnosis code may identify more than one guideline. The user selects the desired guideline from the relatively short menu 46 generated for the given diagnosis code. Entry of a 3 digit code will cause the system to display a list of all of the guidelines containing that diagnosis code. No diagnosis code validation is done. (Note that although the ICD-9-CM code is 5 digits, only the first 3 are used to index.)

The guideline process may also be initiated without identifying a diagnosis. As shown in Figure 12b, the user may input text representing a known or proposed treatment or procedure information in field 47. A procedure or treatment may be found in more than one guideline. Selection is by alpha description allowing for a partial string search of 5 characters into the index list. The procedure descriptions contain the most significant characters first to allow a fixed position search. The search is limited to procedure code descriptions only, excluding complication descriptions and notes. If matching text is found, the treatment containing that text is identified. From that, the guideline(s) containing the identified treatments are located. Therefore, it is possible that treatment text can lead

to more than one guideline. The user then selects the desired guideline from the menu 48 generated in response to the treatment text entered.

After a guideline is selected, the software calls for identification information to be provided by the user. This is shown in the screen depicted in Figure 13. First, the type of review or file is identified. Review type is either initial or extension. Extension review is entered after an initial guideline is used. The extension may be caused by a delayed response or condition in the individual, a complication, a failure of initial treatment, or other reason. Next, a case identification number is entered. It is important that a patient have a unique identification number for each admission to ensure all information on the patient is in a single file. As discussed above, extension review allows the user to add information to an existing file. A clinician or care provider identification number is also entered. Each clinician should be identified by a unique number.

2. Navigating through a Guideline - the Question/Data Collection Phase

Once a guideline is selected, the user proceeds through an interactive process of questions and answers to reach a recommended treatment. An example screen showing part of the process is depicted in Figure 14. Several questions are displayed and a first question 49 is presented to the user by highlighting. There are three question formats. First, the question can be in narrative form as at 49 and require a "pass" or "fail" (corresponding to yes or no, respectively) answer 50. The answer is selected by "pushing" a displayed "button". Second, the question may offer multiple answers as at 52 and permit selection of only a single answer. Response navigation is attached to each multiple-choice selection (only pass applies). Third, the question may provide multiple selections as at 51 and all applicable selections may be chosen. The third type of question is for aboth navigation and data collection and some selections made do not affect subsequent questions. All questions are presented by highlighting the current question and as many questions as possible are displayed on one screen. Questions are numbered to permit tracking the

clinical pathway used to arrive at a recommended treatment. A question and any of the responses may extend over more than one line.

Based on the user's answer to the initial question, another question is presented, but it may not be the next question in the number sequence. Navigation among questions is dependent on answers and some questions may be skipped. Therefore, the user enters only relevant data and does not have to sift through unnecessary or irrelevant questions. No backward navigation is allowed in the questioning logic. However, the user may back up to erase and re-enter responses. The number of questions presented to the user varies depending upon the guideline selected and answers provided.

A question may be arrived at by multiple paths. For example, if question 3 is arrived at from question 1 or 2, then there could be 2 sets of pass/fail navigational options. Ultimately, after navigating through a guideline, the user will be provided with at least one recommended treatment, a new guideline or instructions to seek further clinical evaluation. If questioning determines the need to utilize a different guideline, then the user is either transferred directly to the new guideline and/or a message is displayed. A given combination of answers may lead to multiple recommended treatments as shown by the two highlighted treatments 53, 54 in the screen depicted in Figure 15.

Codes are stored that indicate the path taken through the questioning process (clinical pathway). A "help" menu accessed by a function key is available at any time to further clarify the question, treatment, or list of references. Using the pull-down menu "view" accessed as indicated 56 in Figure 14, the user may review answers to previous questions. However, except in the non-directive mode described below, the user may not work backward or select questions in an arbitrary manner. Due to the navigational control built into a guideline, only relevant questions that are required to reach a recommended treatment

are presented and answered. The user has the ability to exit and suspend review at any time. The review status is stored and the user may continue the review at a later time.

3. Treatment and Review

The guideline question sequence will lead to one or more recommended treatment options, a new guideline, or suggest further clinical evaluation. As shown in Figure 16 all treatment options are displayed to the user with the recommended treatment(s) highlighted. Multiple treatments may be appropriate for a specified combination of answers. A treatment option may be displayed with message or note lines. More than one page of treatments may be present, and the user can page through all treatments.

A treatment option is displayed in eight fields, as shown in the screen depicted in Figure 16. The first field 57 is a two-character treatment code that facilitates tracking of treatments within a guideline. The code is unique within the selected guideline only. Next is a field 58 containing a brief description of the treatment, followed by a field 59 for the applicable numeric procedure code. Multiple procedure codes may be present if a treatment consists of more than one procedure. A procedure code may not always be available for a treatment option. If it is not available, an internal code will be created but not displayed on the screen. The procedure code can be used in reimbursement for the selected treatment.

Next the resource utilization indicators are listed. The treatment setting field 60, labelled, "Setting", identifies inpatient facility (IP), outpatient facility (OP), or physician office (OF). The length of stay field 61, labelled "LOS", provides the number of days for inpatient facilities. The assistant surgeon field 62, labelled "A/S", designates whether an assistant surgeon is required (y=yes; n=no; s=standby). The preoperative days field 62, labelled, "Preop", designates the number of inpatient days required prior to elective surgery. Flag field 64 indicates special considerations such as large case management, physician review, or coordination of services.

As stated previously, the user may enter an actual or proposed treatment prior to or after obtaining the guideline-recommended treatment(s). To enter an actual/proposed treatement after arriving at a guideline recommended treatment, the user utilizes the "Enter" menu and reaches a screen with the format shown in Figure 16. As shown in Figure 16, for the proposed/actual treatment the user enters information in five labelled fields, including treatment code 69 and the resource utilization indicators of Treatment Setting 65, Length of Stay 66, Preoperative Days 67, and Assistant Surgeon 68. The user normally enters a 2-character treatment code corresponding to one of the treatment options listed above fields 65-69. If the proposed/actual treatment is not listed in that guideline, then a reserved code will be entered and the proposed/actual treatment must be described.

If the proposed/actual treatment is not the same as the guideline-recommended treatment, then the system prompts the user to initiate speciality review. Figure 17 shows a screen used in the specialist review process. The specialist review window is overlaid on the treatment options list screen. The following fields have data automatically entered: case ID number 70, review ID number 71, and specialist review number 72. A five-character ID field 73 is user-filled to identify the specialist reviewer. Four types of review with differing associated costs and expertise can be selected: clinical review (CR) 74; physician review (PR) 75; independent medical exam (IME) 76; and appeal 77. Clinical review is conducted by a licensed professional with expertise in a particular specialty including the provider or another on the user staff who has the authority to approve variances. Physician review is by a consulting physician with authority to approve variances. IME is a required referral for a second opinion examination. This type of review is chosen based on individual case merits or for a mandatory second opinion list. Appeal is a review by a consulting physician generated by an appeals notification.

The reason field in the specialty review window includes seven possible reasons why the case was carried to a different level of review,

including appropriate treatment plan 78, partial procedure 79, setting 80, LOS 81, preop days 82, assistant surgeon use 83, and diagnosis confirmation 84. For any given case, multiple reasons could be present. Any variance between the proposed/actual and guideline-recommended treatment are automatically designated. Actual consideration of the case by a specialty reviewer occurs off-line. The result of that review is communicated to the user, who is now enters a final recommendation, incorporating the conclusions reached in specialty review, in the formate required by the screen shown in Figure 16.

With a guideline-recommended treatment identified and a user-selected proposed/actual treatment as well as a final recommended treatment entered in the system-defined format, the system 300 performs comaprisons.

Whenever there is a variance between the treatment or a resource utilization indicator for a final recommended treatment and guideline recommended treatment, the system elicits reasons for the variance(s). The "reason" field corresponding to a resource utilization indicator where there is a variance is highlighted. One character standard reason codes are used to explain overriding the guideline recommended treatment. Reason codes include the following:

A - additional diagnosis (comorbidity)
B - significant clinical findings
C - complication
D - unavailable information
E - alternative care availability
F - facility capability
G - geographic distance
H - social situation
I - surgical stabilization
J - contraindication
K - age
L - practitioner experience

M - patient preference

O - system override

Z - other

For example, "Setting" reason must be completed if the final recommendation treatment Setting is higher than the guideline treatment Setting (IP>OP>OF). "LOS" reason must be completed if the final recommendation LOS is greater than the guideline LOS. "Preop" reason must be completed if the final recommendation Preop days are greater than the guideline Preop days. Assistant Surgeon reason must be completed if the final recommendation Assistant Surgeon use is greater than the guideline Assistant Surgeon (Y>S>N). Diagnosis confirmation reason must be completed if a specialty review reason indicates diagnosis confirmation. [PLEASE CONFIRM]

A final recommendation reason description is entered if there is no standard reason code for the final recommendation treatment or for further explanation even when a standard code exists. For example, it is desirable to elicit user comment identifying other diagnosis information that was considered relevant to treatment selection and may lead to future modification of the guideline. A "button" allows access to a free text entry window.

The "Care Changed" fields are used if the final recommendation treatment is different from the proposed/actual treatment. Whenever there is a variance between the treatment or a resource utilization indicator for a final recommended treatment and actual/proposed treatment, the system elicits reasons for the variance(s). The "reason" field corresponding to a resource utilization indicator where there is a variance is highlighted. Treatment "Care Changed"fiel is used if the final recommendation is different than the proposed/actual treatment. The treating physician indicates whether he agrees with the recommendation (Y, N, U=Unknown). Setting "Care Changed" is used if the final recommendation treatment Setting is different than actual/proposed Treatment Setting. The treating physician indicates whether he agrees

with the final recommendation (Y, N, U=Unknown). LOS "Care Changed" is used if the final recommendation LOS is different than the actual/proposed LOS. The treating physician indicates whether he agrees with the final recommendation (Y, N, U). Preop "Care Changed" is used if the final recommendation Preop days is different than the actual/proposed Preop days. The treating physician indicates whether he agrees with the final recommendation (Y, N, U). Assistant Surgeon "Care Changed" is used if the final recommendation Assistant Surgeon is different than the actual/proposed Assistant Surgeon. The treating physician indicates whether he agrees with the final recommendation (Y, N, U). DX "Care Changed" is used if the case was sent to specialty review for diagnosis confirmation, then the treating physician annotates whether he agrees with the decision (Y, N, U). [PLEASE CONFIRM]

D. An Example Guideline - Thrombophlebitis

An example of the guideline process for a specific health condition is shown in Figure 18, a flow chart for the guideline, thrombophlebitis, in conjunction with previously discussed screens shown in Figure 11-16, which represent portions of the implementation of the flow chart of Figure 18. This flow chart does not include all information presented to the user that would appear on the terminal screen. For example, at step 106 the flow chart shows only the recommended treatment code and treatment text. However, the guideline definition for thrombophlebitis includes and the user would actually be presented with a screen similar to Figure 16 which would include, the CPT code and resource utilization indicators for each treatment option. Also, the flow chart differs from the actual screens in that screen-displayed questions are answered as "pass" or "fail", which correspond to "yes" or "no", respectively, in the flow chart.

Step 100 is the entry point corresponding to selection of the guideline based on the guideline title, as shown in Figure 11, or by use of a diagnosis code, as shown in Figure 12, or a treatment text search, as shown in Figure 13. At step 101, the user is asked whether the condition is a superficial or deep vein thrombosis. If the user selects "superficial", at step

102 the user is asked whether the diagnosis by examination and symptoms includes one of the following: pain, redness, or swelling. If the user selects "no", at step 103 Physician Review is recommended. If the user selects "yes", at step 104 the user is asked whether the patient has progressive symptoms despite appropriate out-patient management. If the user selects "no", at step 105 continuing out-patient treatment is the recommended treatment option. If the user selects "yes", at step 106 a guideline-recommended treatment identified by code 7D is presented.

If the user selects "deep vein thrombosis" at step 101, at step 107 the user is asked whether it was diagnosed on doppler/venogram as shown in Figure 14. If the user selects "no," at step 108, Physician Review is recommended. If the user selects "yes," at step 109, the user is asked whether anticoagulation therapy is contraindicated due to several factors. If the user selects "no," at step 110 two guideline-recommended treatments identified by codes 7A and 7B are presented. No preference between the two treatments is identified. At step 111, the user is asked whether the treatment failed. If the user selects "no", at step 112 guideline indicates that the individual is to be discharged. If the user selects "yes", at step 113 a new guideline-recommended treatment identified by code 7C is presented.

If at step 109 the user selects "yes", at step 114 the user is asked whether there is proximal embolization. If the user selects "no", at step 115 the guideline recommended treatment identified by code 7C is presented. If the user selects "yes," at step 116 the user is referred to additional medical literature for further diagnosis.

The screens implementing this guideline include all of the questions and conditional branching necessary to navigate through the flowchart of Figure 18 and reach each of the treatment options or other endpoints shown.

For example, the screens presenting questions would appear similar to Figure 14 with the current question highlighted. When the guideline reaches a recommended treatment, the user would be presented with a

screen similar to Figure 17, without the Specialist Review sub-screen, showing guideline recommended treatment options with the recommended treatment(s) highlighted. Figure 17 reflects a question/answer path yielding two recommended treatments. Figure 16 shows one recorded treatment reached by a different question/answer path through the guideline. Figure 16 also differs from Figure 17 in that the user has additionally entered a proposed and final recommendation treatment.

E. Alternative Embodiments of the Invention

The above embodiment of the invention is a directive mode whereby the guideline process is self-prompting and the user is only required to answer designated questions. In an alternative embodiment invention, the guidelines can be accessed in a non-directive mode whereby the user can access all questions for a given guideline, to view and selectively answer the questions. At any point, the user can shift back to the directive mode and the questions will again be self-prompting with a question appearing based on the questions already answered in the non-directive mode. [Explain utility? Can recommended treatments be bound?]

F. Reports

An important feature of the present invention is its ability to capture key data during usage for individual patients and cases. This enables the user to track and analyze patterns of care across defined populations in order to understand trends and variations for planning purposes. In addition, reports can show provider profiles, diagnostic decision outcome profiles, as well as procedure decision outcome profiles. On line reports include administrative reports, summary reports and worksheets. Reports may be used by reviewers as work and time management tools and by administrators and managers for summary reports and planning tools. Reports may selected for designated time frames.

Reports sort and summarize case review status in several ways. Case review status includes the following: closed, i.e. closed (C) by normal review procedures or closed by administrative closed (A); and open, i.e. suspended in questioning (Q), and specialty review (S), or open because the review process has not been completed (O).

There are six types of daily Productivity Reports: operation manager, supervisor, care manager, specialist reviewer, specialist reviewer productivity, and specialist review worksheet. An example of a operation manager report is shown in Appendix A. This is a general summary report which summarizes all open case reviews by medical category 200, i.e., reviews with the status of O, Q or S. A total of all open case reviews for all categories 201 is also listed. Initial reviews 202 as well as extension reviews 203 for each category are listed as well as case reviews and specialty review 204. This report also summarizes case reviews which are still open and over 30 days old 205 and open reviews which are less than or equal to 30 days from the initial review data entry 206.

An example of a supervisor report is shown in Appendix B. This is a general summary report which summarizes all open case reviews (with status O, Q, or S) and is sorted by care manager (reviewer). A total of all open case reviews for each care manager is listed 207. Initial reviews 208 as well as extension reviews 209 are listed as well as cases 210 and specialty review 211. This report also summarizes case reviews which are still open and over 30 days old 212 and open case which are less than or equal to 30 days from the initial review data entry 213.

An example of the care manager report is shown in Appendix C. This is a general summary report which summarizes all open case reviews (status O, Q or S) by individual care manager (reviewer) 214. This report summarizes for each care manager all open case reviews listing the case ID 215, the most current review date for the review 216, identifying whether the review was initial or extension 217, the specialist review type (physician reviewer, independent medical exam/second opinion appeal) 218, referral reason 219, and the case review guideline name 220. This

report is generally used by the care manager for follow-up and tracking and by the specialist reviewer as a time management and daily or weekly work planning tool.

An example of a specialist reviewer report is shown in Appendix D. This is a general summary report which summarizes open case reviews with specialist status (S) reviewer sorted by reviewer ID, case ID, and review date. This report summarizes for each specialist reviewer 221 all open case reviews listing the case ID 222, the most current review date for the review 223, identifying whether the review was initial or extension 224, the specialist review type (clinical reviewer, physician reviewer, independent medical exam/second opinion, appeal) 225, referral reason 226, and the case review guideline name 227. This report is generally used by the care manager for follow-up and tracking and as a daily or weekly planning tool.

An example of the specialist reviewer productivity report is shown in Appendix E. This summarizes reviews with a specialist review status (S) sorted by medical category and specialist review type, case ID and review date. For each of these the following are listed: the case ID 228 with the most current review date for the review 229, whether the review was initial or extension 230, specialist identification number 231, referral reason 232 and the case review guideline name 233.

An example of a specialist review work sheet is shown in Appendices F, G. This report summarizes pertinent information for a case review which needs a specialist review. This would most commonly be used for physician review although it can be used for clinical review, independent medical exam/second opinion or appeal. The report lists the specialist reviewer 234, the case 235 and clinician ID 236, the proposed treatment 237 and guideline recommended treatment 238 with appropriate resources downloaded with the software. Questions passed and failed are summarized 239 and the reason for the specialist review 240 is identified. Note text 241 which has been entered for the case is included. This report is completed by the care manager (reviewer), printed and

distributed to the appropriate specialist reviewer. The specialist reviewer would discuss the case with the appropriate resources, complete the final recommendation 242 and outcome and return the worksheet to the care manager who would enter the reason code 243 and text into the case review file.

Information management reports identify overall volume and patterns of care including diagnosis, therapeutic selection and resource use. From these reports, you can determine the level of effectiveness or impact related to each guideline use. You can also use the reports for quality measurement and planning by identifying where variations are occurring and how they are resolved at the initial guideline level. Reports may be selected by date in either clinician identification number or reviewer identification number or both. They are sorted automatically by specialty area.

An example of a reporting period summary shown in Appendix H. This report gives an overall summary of all cases in reviews. It lists case volume 244 (number of total cases), review volume 245 (number of individual reviews), the number of physicians 246, and the number of different guidelines used for initial and extension reviews 247. This report may be sorted for a specific time.

An example of a guideline frequency report is shown in Appendix I. This report lists in how many cases a particular guideline is used 248. The percent of cases using each guideline 249, and the percent of total cases that guideline represents 250 are also listed.

An example of a patterns of care report is shown in Appendix J. This report lists the total number of cases using the various guidelines 251. The proposed treatment(s) for each guideline 252 are listed with the number of cases for each 253. Proposed average length of stay 254 and recommended length of stay 255 are also listed for each guideline proposed treatment. This report can also be sorted by overall total or clinician identification number.

An example of a quality management and planning (aggregate) report is shown in Appendix K. This is an aggregate report which lists the total number of cases with the requested diagnosis. For each diagnosis guideline requested 256, the following are listed: proposed 257 and final treatment combination 258, number of total cases with that combination 259, percent of total cases 260, what percent went to specialist review 261, how many varied from the guideline 262, the number with a guideline variance 263, the number of times each variance code was used 264 and the percent of care changed by the treating physician/care provider 265.

An example of a quality management and planning (for each component) report is shown in Appendices L, M. This report is sorted by guideline 266, proposed treatment 267, and final recommendation 268. This report is a more detailed report and is a subset of the aggregate quality management and planning report. It lists the three categories of setting 269, preoperative days 270 and length of stay 271. The total number of cases are listed 272. For each guideline in each category, the following are listed: proposed 273 and final recommendation treatment 274, number of cases under each category 275, percent of the cases that carry the proposed/final combination 276, percent to specialist review 277, guideline variations 278, the number with a guideline variance 279, the number of times each variance code was used 280, and the percent of care changed by the treating physician 281.

An example of the effectiveness report is shown in Appendix N. This report provides a breakdown by guideline 282 of the results of its use (or impact) on the following areas: percentage of reviews where proposed treatment selection was impacted 283, percentage of reviews where proposed resources were impacted 284, percentage of reviews where both treatment selection and proposed resources were impacted 285, and the percentage of total cases impacted 286 and total cases 287.

Although the description of the preferred embodiment has been presented, it is contemplated that various changes could be made without deviating from the spit of the present invention. Accordingly, it is

intended that the scope of the present invention be dictated by the appended claims rather than by the description of the preferred embodiment.

APPENDIX A

Date Daily Productivity Report Page 1
Operation Manager

Medical Category (200)		Open Reviews	# to Specialist Review (204)	Open <=30 days (206)	Open >30 days (205)
Cardiovascular/Respiratory					
(202)	Initial	24	4	22	2
	Extension	6	1	6	0
(203)	Total	30	5	28	2
Gynecology					
	Initial	10	2	10	0
	Extension	2	0	2	0
(201)	Total	12	2	12	0
TOTAL	Initial	34	6	32	2
	Extension	8	1	8	0
	Total	42	7	40	2

APPENDIX B

Date Daily Productivity Report Page 1
Supervisor

Medical Category: Cardiovascular/Respiratory

Care Manager	Review Type	Open Reviews	# to Specialist Review	Open <=30 days	Open >30 days
ABCDE	Initial	24	4	22	2
	Extension	6	1	6	0
	Total	30	5	28	2
DEFGH	Initial	10	2	10	0
	Extension	2	0	2	0
	Total	12	2	12	0
TOTAL	Initial	34	6	32	2
	Extension	8	1	8	0
	Total	42	7	40	2

APPENDIX C

Date Daily Productivity Report Page 1
Care Manager

Care Manager: ABCDE {Name} 214

Case ID 215	Review Date 216	Init/ Ext 217	Spec Type 218	Referral Reason 219	Guideline 220
058011112223	05/01/92	I	PR	TPLAN	Angina, Stable
058011112223	05/05/92	E			Angina, Stable
011122223333	05/10/92	I	PR	SET LOS	Degenerative Joint Disea
012333332229	05/01/92	I			Degenerative Joint Disea

APPENDIX D

Date Daily Productivity Report Page 1
Specialist Reviewer

Specialist Reviewer: XYZAB (221)

Case ID (222)	Review Date (223)	Init/ Ext (224)	Spec Type (225)	Referral Reason (226)	Guideline (227)
058011112223	05/01/92	I	PR	TPLAN	Angina, Stable
058011112223	05/05/92	E	PR	LOS	Angina, Stable
011122223333	05/10/92	I	PR	SET LOS	Degenerative Joint Disea
012333332229	05/01/92	I	PR	TPLAN	Degenerative Joint Disea

APPENDIX E

Date Daily Productivity Report Page 1
Specialist Reviewer Productivity

Medical Category: Cardiovascular/Respiratory
Specialist Type: PR Physician Referral

Case ID (228)	Review Date (229)	Init/ Ext (230)	Spec ID (231)	Referral Reason (232)	Guideline (233)
058011112223	05/01/92	I	XYZAB	TPLAN	Angina, Stable
058011112223	05/05/92	E	XXXXY	LOS	Angina, Stable
011122223333	05/10/92	I	XYZAB	SET LOS	Thrombophlebitis
012333332229	05/01/92	I	XYZAB	TPLAN	Arterial Occlusive Disea

APPENDIX F

Date Specialist Review Work Sheet Page 1

Specialist Reviewer: XYZAB 234 Return to: _____

Care Manager: ABCDE 235 By (date): _____
Case Id: 000005100001 Review #: 2
Clinician Id: A00100 236
Review Date: 6/05/92
Diagnosis: Calculus, Ureteral

Proposed Treatment: 237

	Setting	LOS	Preop	A/S
4A) Cystoscopy with retrograde stone manipulation	IP	*02	0	N

Guideline Recommended Treatment: 238

	Setting	LOS	Preop	A/S
4A) Cystoscopy with retrograde stone manipulation	IP	01	0	N
4B) Urethroscopy/ureteropyeloscopy	IP	01	0	N
4C) Cystoscopy with JJ stent placement	OP			N

Questions Passed: 239

Diagnosed by imaging and one of the following:
flank pain - severe requiring IM pain meds

One of the following:
-high grade obstruction
-severe intractable pain
-stone too large to pass

Questions Failed: 240

Reason for Specialist Review:
Length of Stay 241

Note Text Information:
cysto urethroscopy stone extraction insertion stent attempted wo success perc neph done due to urine extravasation temp po oral abs teach perc neph care monitor

Date Specialist Review Work Sheet Page 2

Specialist Reviewer: XYZAB

Case Id: 000005100001 Review #: 2
Clinician Id: A00100
Review Date: 6/05/92
Diagnosis: Calculus, Ureteral

242

Final Recommendation (document changes only)		243 Reason Code	243a Care Changed?
*Treatment:	_____	_____	Y N U
Setting: IP OP OF	_____	_____	Y N U
*LOS: ____ days	_____	_____	Y N U
Preop: ____ days	_____	_____	Y N U
A/S: Y N S	_____	_____	Y N U
*DX Confirm Y N	_____	_____	Y N U

APPENDIX G

Case Volume:	1,245	244
Review Volume:	1,999	245
# Physicians:	42	246
# Guidelines:	70	247

APPENDIX H

Medical Category: Cardiovascular/Respiratory

Guideline	248 Cases	249 % of Cases	250 % of Total Cases
Coronary Artery Disease	50	35.0	10.0
Angina, Stable	20	10.0	4.0
Angina, Unstable	20	10.0	4.0
Asthma	10	5.0	2.0
Pneumonia	14	7.0	2.8
Arterial Occlusive Disease	5	2.5	1.0
.	.	.	
.	.	.	
.	.	.	
SUBTOTAL	200	100.0	40.0
TOTAL	500	100.0	100.0

APPENDIX I

Medical Category: Cardiovascular/Respiratory

Guideline	251 Cases	252 Proposed Treatment	253 Cases	254 Proposed Avg LOS	255 Avg LOS Recommended
Coronary Artery Disease	50	PTCA	47	3	3
		CABG,3 grafts	3	9	8
Angina, Unstable	20	Telemetry	3	2	2
		Telemetry/ pacemaker	2	3	3
		Telemetry/ angiogram	10	4	3
		Angiogram WO/CC*	2	1	1
		Angiogram WO/CC*	3	1	0
Arterial Occlusive Disease	5	Arteriogram	2	2	1
		Bypass	3	8	7

*comorbidity

APPENDIX J

Guideline: (5310) Coronary Artery Disease —256a

Cases: 50 —256

Treatment — 257 / 258		259 Cases	260 %	261 % to Spec Rev	GL Variance Volume	Code*	265 Care Changed %	Known
Proposed	Final							
PTCA	PTCA	45	90	11	5	A(4) K(1)		
CABS/ 3 graft	CABG/ 3 garft	3	6	33	1	F(1)		
Proposed = final:		48	96					
PTCA	Medical Management	2	4	100			50	100
Proposed ≠ final:		2	2					

262 263 264

APPENDIX K

Guideline: (5310) Coronary Artery Disease — 266 Page 1

267 ---Treatment-- 268 Proposed	Final	272 Cases	%	% to Spec Rev	Ext Rate	GL Variance Volume	Code	Care Changed %	Known
PTCA	PTCA	45	90.0						
269 273 --SETTING(OP)		274	275	276	277	278	279	281	
IP	IP	45	100.0						
Proposed=Final:		45	100.0						
270 --PREOP(0)									
0	0	43	95.0	0.0					
1	1	1	2.5	100.0		1	A(1) 280a		
Proposed=Final:		44	97.5			280			
1	0	1	2.5	100.0					
Proposed≠Final:		1	2.5						
271 ----LOS									
3	3	35	77.8						
4	4	5	11.1	20.0	20.0	5	H(4)		
Proposed=Final:		40	88.9						
4	3	5	11.1	10.0				80.0	50
Proposed≠Final:		5	11.1						

*Key: A=Comorbidity
H=Social Situation
K=Age

APPENDIX L

Guideline (282)	% Review Impact Proposed Treatment (283)	% Review Impact Proposed Resources (284)	Reviews impacted both resources and Treatment (285)	% Cases Impacted (286)	# Cases (287)
Coronary Artery Disease	4	13	1	14	50
Angina, Unstable	1	25	0	30	20
Arterial Occlusive Disease	0	40	0	40	5

Claims

1. In a health care management system comprising a processing unit, at least one memory unit and means for interactively exchanging information with a user of the system, a method of analyzing health care treatment for individuals having one or more specified health care conditions by reference to specified health care guidelines, comprising:

(a) defining one or more health care conditions for which treatment exists;

(b) providing to the system one or more diagnosis-based guidelines corresponding to each of said one or more specified health care conditions and including at least one guideline treatment option; and

(c) for at least one individual, interactively exchanging with the system information on characteristics of the individual relevant to the observed health care condition, said exchange utilizing data collection nodes and conditional branching in a diagnosis-based guideline, to arrive at an endpoint selected from the group consisting of: a guideline treatment option, an indication to select another one of the diagnosis-based guidelines, or an indication for further clinical evaluation.

2. The method of claim 1, further comprising:

(d) providing to the system information identifying an actual or proposed treatment when said interactive exchange arrives at a guideline treatment option for the at least one individual;

(e) comparing the actual or proposed treatment for the at least one individual against the guideline treatment option corresponding to the defined health care condition observed in that individual; and

(f) developing a treatment evaluation based on the comparison of step (e) and including identifying discrepancies between the guideline treatment option and the actual or proposed treatment for the at least one individual provided in step (d).

3. The method of claim 1 wherein steps (a) and (b) result in the system having more than one diagnosis-based guideline, further comprising:

(g) for at least one individual, selecting at least one of the diagnosis-based guidelines corresponding to a defined health care condition observed in that individual.

4. The method of claim 3 wherein the step of selecting, for at least one individual, at least one of the diagnosis-based guidelines corresponding to a defined health care condition observed in that individual comprises the system user selecting a name for the health care condition from a list of health care conditions provided by the system.

5. The method of claim 3 wherein the step of selecting, for at least one individual, at least one of the diagnosis-based guidelines corresponding to a defined health care condition observed in that individual comprises the system user providing text describing a treatment for said health care condition and the system finding any treatment guidelines containing the text provided.

6. The method of claim 3 wherein the step of selecting, for at least one individual, at least one of the diagnosis-based guidelines corresponding to a defined health care condition observed in that individual comprises the system user providing a predefined diagnosis code for said health care condition.

7. The method of claim 6 wherein the step of providing a diagnosis code comprises providing a standardized diagnosis number code.

8. The method of claim 6 wherein the step of providing a diagnosis code comprises providing an ICD-9-CM code.

9. The method of claim 1 wherein the step of providing one or more diagnosis-based guidelines consists of providing guidelines having at least two alternative guideline treatment options linked by at least one test that selects one treatment option as the more appropriate when the test is satisfied.

10. The method of claim 1 wherein the step of providing one or more diagnosis-based guidelines comprises providing at least one treatment option having at least one treatment resource limitation parameter.

11. The method of claim 10 wherein the at least one treatment resource limitation parameter is based on a resource selected from the group consisting of: treatment setting, inpatient length of stay, requirement for assistant surgeon, and inpatient preoperative stay length.

12. The method of claim 1 wherein multiple health care conditions for which treatment exists are defined and for each of the multiple health care conditions there is one corresponding diagnosis-based guideline provided.

13. The method of claim 3 further comprising the steps of:

(h) providing to the system information identifying a final recommendation treatment for the at least one individual based on the evaluation of step (f); and

(i) for each discrepancy between the guideline treatment option and the final recommendation treatment for the at least one individual provided in step (h), requesting a system user to provide to the system information specifying the basis for selecting the final recommendation treatment causing the discrepancy to arise.

14. The method of claim 13 further comprising eliciting from a system user information documenting the differences between final recommendation treatment and the actual or proposed treatment.

15. The method of claim 1 wherein the step of defining one or more health care conditions comprises defining one or more health care conditions in the nature of a disease or organic dysfunction.

16. The method of claim 2 wherein the step of providing information identifying treatment for the at least one individual comprises providing information relating solely to planned treatment.

17. The method of claim 2 wherein the step of providing information identifying treatment for the at least one individual comprises providing information relating solely to treatment given.

18. The method of claim 2 wherein the step of providing information identifying treatment for the at least one individual comprises providing information relating to both planned treatment and treatment given.

19. The method of claim 1 wherein the step of providing one or more diagnosis-based guidelines comprises providing guidelines having at least two alternative guideline treatment options linked by at least one test that selects one treatment option as the more appropriate when the test is satisfied and at step (c) the interactive exchange of information with the system user determines if the test is satisfied.

20. The method of claim 19 wherein the at least one test is a question seeking a response selected from among two or more predetermined responses.

21. A medical information system for analyzing health care treatment for individuals having a specified health care condition to evaluate such treatment against specified health care guidelines comprising:

(a) a central processing unit;

(b) at least one memory unit connected to said central processing unit;

(c) means for defining one or more health care conditions for which treatment exists;

(d) means for providing to the system one or more diagnosis-based guidelines corresponding to each of said one or more specified health care conditions and including at least one guideline treatment option; and

(e) means for interactively exchanging with the system information for at least one individual on characteristics of the individual relevant to the observed health care condition, said exchange utilizing data collection nodes and conditional branching in a diagnosis-based guideline, to arrive at an endpoint selected from the group consisting of: a guideline treatment option, an indication to select another one of the diagnosis-based guidelines, or an indication for further clinical evaluation.

22. The medical information system of claim 21, further comprising:

(f) means for providing to the system information identifying a treatment for the at least one individual when the means for interactively exchanging with the system information on characteristics of the individual relevant to the observed health care condition arrives at a guideline treatment option;

(g) means for comparing the treatment identified for the at least one individual against the guideline treatment option corresponding to the defined health care condition observed in that individual; and

(h) means for developing a treatment evaluation based on the comparison of element (g) and including identifying discrepancies between the guideline treatment option and the information identifying treatment for the at least one individual provided by element (f).

23. The medical information system of claim 21 wherein means (c) and (d) provide the system with more than one diagnosis-based guideline, further comprising:

(i) means for selecting, for at least one individual, at least one of the diagnosis-based guidelines corresponding to a defined health care condition observed in that individual.

24. The system of claim 23 wherein the means for selecting, for at least one individual, at least one of the diagnosis-based guidelines corresponding to a defined health care condition observed in that individual comprises means for the system user selecting a name for a health care condition from a list of health care conditions provided by the system.

25. The system of claim 23 wherein the means for selecting, for at least one individual, at least one of the diagnosis-based guidelines corresponding to a defined health care condition observed in that individual comprises means for the system user providing text describing a treatment and the system finding any treatment guidelines containing the text provided.

26. The system of claim 23 wherein the means for selecting, for at least one individual, at least one of the diagnosis-based guidelines corresponding to a defined health care condition observed in that individual comprises means for the system user providing a predefined diagnosis code.

27. The system of claim 26 wherein the means for providing a diagnosis code comprises means for providing a standardized diagnosis number code.

28. The system of claim 26 wherein the means for providing a diagnosis code comprises means for providing an ICD-9-CM code.

29. The system of claim 21 wherein the means for providing one or more diagnosis-based guidelines comprises means for providing guidelines having at least two alternative guideline treatment options linked by a test that selects one treatment option as the more appropriate when the test is satisfied.

30. The system of claim 21 wherein the means for providing one or more diagnosis-based guidelines comprises means for providing at least one treatment option having at least one treatment resource limitation parameter.

31. The system of claim 30 wherein the at least one treatment resource limitation parameter is based on a resource selected from the group consisting of, treatment setting, inpatient length of stay, requirement for assistant surgeon, or inpatient preoperative stay length.

32. The system of claim 21 wherein multiple health care conditions for which treatment exists are defined and for each of the multiple health care conditions there is one corresponding treatment guideline provided.

33. The system of claim 23 further comprising:

(j) means for providing to the system information identifying a final recommendation treatment for the at least one individual based on the evaluation of element (h); and

(k) means for identifying and requesting a system user to provide to said system, for each discrepancy between the guideline treatment option and the final recommendation treatment for the at least one individual provided in element (j), information specifying the basis for selecting the final recommendation treatment causing the discrepancy to arise.

34. The system of claim 33 further comprising means for eliciting from a system user information documenting the differences between final recommendation treatment and the actual or proposed treatment.

35. The system of claim 21 wherein the means for defining one or more health care conditions comprises means for defining one or more health care conditions in the nature of a disease or organic dysfunction.

36. The system of claim 22 wherein the means for providing information identifying treatment for the at least one individual comprises means for providing information relating solely to planned treatment.

37. The system of claim 22 wherein the means for providing information identifying treatment for the at least one individual comprises means for providing information relating solely to treatment given.

38. The system of claim 22 wherein the means for providing information identifying treatment for the at least one individual comprises means for providing information relating to both planned treatment and treatment given.

39. The system of claim 21 wherein the means for providing one or more diagnosis-based guidelines comprises means for providing guidelines having at least two alternative guideline treatment options linked by at least one test that selects one treatment option as the more appropriate when the test is satisfied and at step (e) the interactive exchange of information with the system user determines if the test is satisfied.

Fig. 1

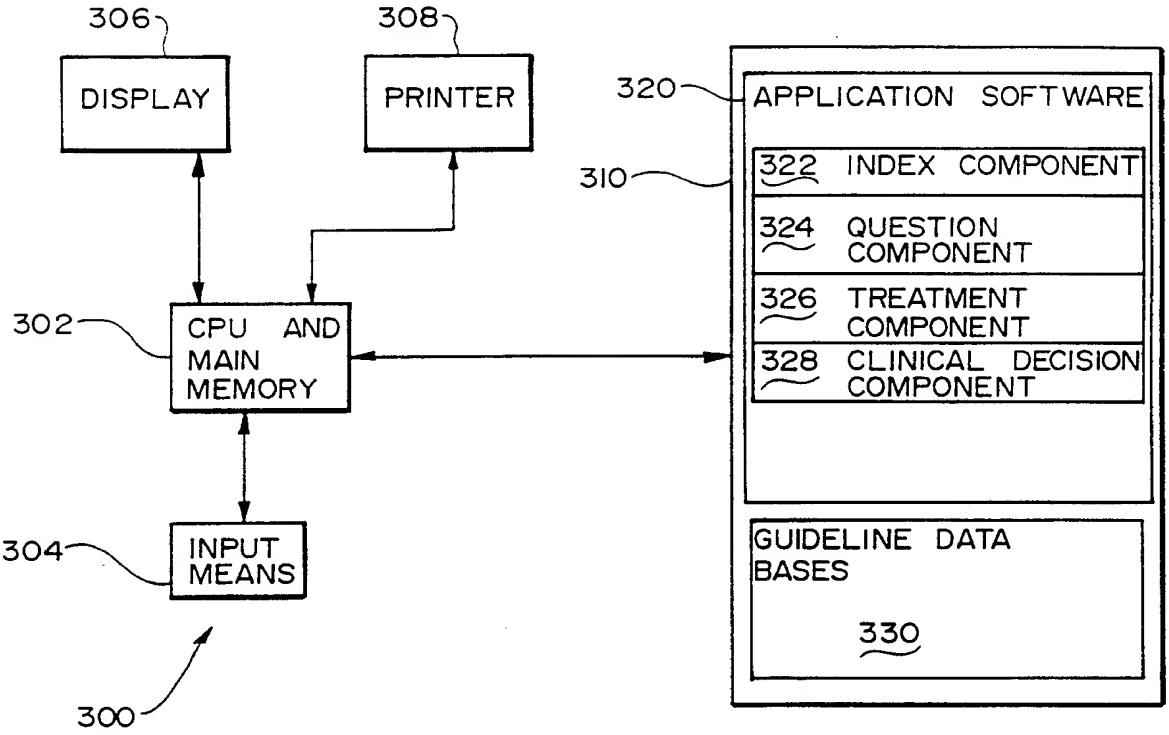


Fig. 2

Fig. 2a

Fig. 2b

Fig.2a

MED CAT NUM	MEDICAL CATEGORY DESCRIPTION	GL NUM (12)	GL EXT (13)	GUIDE LINE DESCRIPTION (14)
52	BLOOD/INFECTIOUS DISEASE	90		BLOOD/INFECTIOUS DISEASE; EST, SURGICAL
		91		BLOOD/INFECTIOUS DISEASE; EXT, MEDICAL
53	CARDIOVASCULAR/RESPIRATORY	01		ANGINA, STABLE; REQUESTING ANGIOGRAM
		02		MI, ACUTE
			X	MI, ACUTE; EXTENSION
		03		PNEUMONIA, ADULT
		05		ASTHMA, BRONCHIAL
		08		PULMONARY EMBOLI
			X	PULMONARY EMBOLI; EXTENSION
		09		CHEST PAIN
				ANGINA, UNSTABLE
				PRE-INFARCTION SYNDROME
			X	CHEST PAIN; EXTENSION
		10		CORONARY ARTERY DISEASE (CAD)
				ARTERIOSCLEROTIC HEART DISEASE (ASHD)
			X	CORONARY ARTERY DISEASE; EXTENSION
		13		CHF
				CONGESTIVE HEART FAILURE
		15		ARRHYTHMIA
		20		VARICOSE VEINS
		22		ARTERIAL OCCLUSIVE DISEASE, PERIPHERAL
				FEMORAL-POPLITEAL OCCLUSION
				FEMORAL-TIBIAL OCCLUSION
				AORTIC-ILIAC OCCLUSION

SUBSTITUTE SHEET

Fig.2b

		23		DEEP VEIN THROMBOSIS
				THROMBOPHLEBITIS
			X	THROMBOPHLEBITIS; EXTENSION ~15
		33		PNEUMONIA, PEDIATRIC
		90		CARDIOVASCULAR/RESPIRATORY; EXT, SURG.
		91		CARDIOVASCULAR/RESPIRATORY; EXT, MEDICAL
54	CENTRAL NERVOUS SYSTEM	01		NEURO DEFICIT, MOTOR OR SENSORY
		02		TIA
				TRANSIENT ISCHEMIC ATTACK
		09		MULTIPLE SCLEROSIS
		90		CENTRAL NERVOUS SYSTEM; EXT, SURGICAL
		91		CENTRAL NERVOUS SYSTEM; EXT, MEDICAL
55	OTOLARYNGOLOGY/OPHTHALMOLOGY	01		SEPTUM DEVIATION, NASAL
				NASAL OBSTRUCTION
		02		SINUSITIS, ACUTE
			X	SINUSITIS, ACUTE; EXTENSION
		10		TONSILLITIS, ACUTE
		11		TONSILLITIS, CHRONIC
				TONSILLITIS, RECURRENT
		13		OTITIS MEDIA, ACUTE
		14		OTITIS MEDIA, CHRONIC
		16		TONSILLAR HYPERTROPHY
		54		SINUSITIS, CHRONIC; MAXILLARY/ETHMOID
		55		SINUSITIS, CHRONIC; FRONTAL
		57		NASAL/SINUS POLYPS
		58		SINUSITIS, SPHENOID

SUBSTITUTE SHEET

Fig. 3

16 GUIDE LINE	17 DX CODE
53(05)	49311
	49321
	49390
	49391
53(08)	4151
53(08X)	4151
53(09)	4111
	4139
	4140
	4149
	4280
	78650
53(09X)	4111
	4139
	4140
	4149
	4280
	78650
53(10)	4111
	4139
	4140
	4149
53(10X)	4111
	4139
	4140
	4149
53(13)	40291
	4280
53(15)	
53(20)	4540
	4541
	4549
	45981
53(22)	25070
	25071
	4402
	4423
	44389
	4439
	44422
	44481
	4471
53(23)	4439
	44422
	44489
	4449
	45119

Fig. 4

GUIDE LINE (18)	QUES NUMBER/DESCRIPTION (19)	FRM PASS (22, 20)	FAIL (21)
53(22)	01B PAIN AT REST IN THE LEG, MAY INCLUDE NIGHT PAIN	02 —23a	
	01C GANGRENE OF FOOT	02	
	01D NON-HEALING ULCERATION OF FOOT	02	
	01E NONE OF THE ABOVE	PR	
	02 PATIENT HAS HAD ARTERIOGRAM	03	4A 4B
	03 HIGH GRADE STENOSIS >75% OR COMPLETE OCCLUSION	04	PR 2A
	04 LENGTH OF LESION < 5 CM	4C 4D 4E 4F	4F
53(23)	01 DEEP VEIN THROMBOSIS DIAGNOSED ON DOPPLER/VENOGRAM	03	02
	02M SUPERFICIAL THROMBOPHLEBITIS DIAGNOSED BY EXAM AND ONE OF THE FOLLOWING:		
	02A PAIN	05	
	02B REDNESS	05	
	02C SWELLING	05	
	02D NONE OF THE ABOVE	PR	
	03 IS THERE PROXIMAL EMBOLIZATION?	OT	04
	04M ANTICOAGULATION THERAPY CONTRAINDICATED DUE TO:		
	04A SENSITIVITY TO HEPARIN	4A —23b	
	04B GI OR INTRACEREBRAL BLEED	4A	
	04C PATIENT HAS CA OR ESPECIALLY METASTATIC CA	4A	
	04D OTHER CONTRAINDICATION	4A	
	04E NO CONTRAINDICATION	2A 2B	
	05 PATIENT HAS PROGRESSIVE SYMPTOMS DESPITE APPROPRIATE OP MANAGEMENT (INCLUDES ANTIBIOTICS, REST, HOT PACKS AND/OR NSAID'S)	2C	
53(23X)	01 MEDICAL MANAGEMENT FAILED	4A	
53(33)	01M DIAGNOSED ON IMAGING AND ONE OF THE FOLLOWING:		

SUBSTITUTE SHEET

SUBSTITUTE SHEET

Fig.5

18 GUIDE LINE	19 QUES NUMBER/DESCRIPTION	22 FRM PASS	20 PASS	21 FAIL
55(91)	01M ONE OF THE FOLLOWING:			
	01A PERSISTENT NAUSEA AND/OR VOMITING AND/OR UNABLE TO TOLERATE LIQUID DIET X24 HOURS	2A		
	01B ABNORMAL LABS, ONE OR MORE OF THE FOLLOWING: -ELEVATED WBC < =12,000 MM -ELEVATED TEMPERATURE >=100 F (37.7 C), ORAL -POSITIVE BLOOD CULTURE	2B		
	01C CONTINUED INFECTIOUS SYMPTOMS (SWELLING, REDNESS, PAIN) AND OUTPATIENT TREATMENT CONTRAINDICATED	2C		
	01D MEDICATION COURSE CHANGED DUE TO CULTURE RESULTS	2D		
	01E ACUTE CLOSED ANGLE GLAUCOMA, INTRAOCCULAR PRESSURE ELEVATED	2E		
	01F NONE OF THE ABOVE	PR		
56(01)	01M DOES THE PATIENT HAVE ANY COMBINATION OF THESE:			
	01A RLQ TENDERNESS	02		
	01B ABDOMINAL PAIN	02		
	01C REBOUND TENDERNESS	02		
	01D NAUSEA/VOMITING	02		
	01E PERIUMBILICAL PAIN	02		
	01F LEUKOCYTOSIS	02		
	01G NONE OF THE ABOVE	03		
	02 PRESENCE OF AN ABSCESS OR PERITONITIS ASSOCIATED WITH THE APPENDICITIS	4A		4B
	03 HISTORY OF PREVIOUSLY CONSERVATIVELY TREATED APPENDICITIS	4C	4D	PR
56(01X)	01 LAPAROSCOPIC APPENDECTOMY FAILED, DID OPEN PROCEDURE	4A		56(90) —24
56(02)	01 DX MADE BY IMAGING, I.E.: ULTRASOUND CHOLECYSTOGRAM DISIDA	02		PR

Fig.6

GUIDE LINE	QUES NUMBER/DESCRIPTION	FRM PASS	FAIL
53(03)	04A AGE >65	2B 2C	
	04B IMMUNOSUPPRESSED	2B 2C	
	04C COMORBID ILLNESS (DIABETES, CHF, COPD, ASTHMA, RENAL FAILURE TB, MALIGNANCY	2B 2C	
	04D HIGH RISK PNEUMONIA ETIOLOGY SUSPECTED OR CONFIRMED BY CULTURE STAPHYLOCOCCAL, GRAM NEGATIVE ROD, ASPIRATION)	2B 2C	
	04E LUNG ABSCESS, EMPYEMA, CAVITARY LESIONS WITH OR WITHOUT RELATED INFECTION	2B 2C	
	04F HIV AND/OR AIDS PNEUMOCYSTITIS**	2B 2C	
	04G NONE OF THE ABOVE	02P 2A 2C 03A 2A 2C 03B 2A 2C 03C 2A 2C 03D 2A 2C 03E 2A 2C 03F PR	
53(05)	01 DIAGNOSED BY HISTORY/KNOWN ASTHMATIC	02	OT PR
	02M EMERGENCY TREATMENT INITIATED WITH CONTINUED PRESENCE OF ONE OF THE FOLLOWING:		
	02A SPIROMETRY RESULTS OF: FEBI < 60% OF PREDICTED OR PEAK FLOW < 40% OF PREDICTED	2A 2B	
	02B BLOOD GAS RESULTS OF: PCO2 >40mmHg OR PO2 < 60mmHg OR O2 SATURATION < 90%	2A 2B	
	02C PRESENTING SIGNS OR SYMPTOMS OF: USE OF ACCESSORY MUSCLES OR ABNORMAL VITAL SIGNS (RESPIRATORY RATE >26/MINUTE, PLUSE >102/MINUTE)	2A 2B	
	02D SEVERE DYSPNEA EVEN AFTER TREATMENT WITH INHALED MEDS	2A 2B	
	02E NONE OF THE ABOVE	PR	
53(08)	01M DIAGNOSTIC RESULTS OF ONE OF THE FOLLOWING:		
	01A HIGHLY PROBABLE LUNG SCAN	03	
	01B POSITIVE PULMONARY ANGIOGRAM	03	

SUBSTITUTE SHEET

Fig. 7

25 GUIDE LINE	26 REC NUM	33 CODE	27	28 SETTING	29 A/S	30 LOS	31 PREOP	32 FLAG
53(23)	OT	A0001	OTHER DIAGNOSIS	OP	N	0	0	
	PR	A0002	PHYSICIAN REVIEW	OP	N	0	0	
	2A	C0005	IV HEPARIN AND COUMADIN (COUMADIN MUST BE INITIATED BY AT LEAST DAY 2 OF HEPARINIZATION)	1P	N	7	0	
	2B	C0007	STREPTOKINASE OR UROKINASE FOR 3 DAYS FOLLOWED BY 6 DAYS HEPARIN WITH COUMADIN INITIATED BY DAY 2 OF HEPARINIZATION	1P	N	9	0	
	2C	C0008	BED REST, WITH OR WITHOUT ANTIBIOTICS, WITH OR WITHOUT ANTICOAGULANTS, WITH OR WITHOUT NSAID'S	1P	N	2	0	
	2D	C0019	ANTIBIOTICS, REST, HOT PACKS AND/OR NSAID'S	1P	N	2	0	
	4A	34421	EMBOLECTOMY OR THROMBECTOMY, VENA CAVA, ILIAC, FEMOROPOPLITEAL VEIN BY LEG INCISION	1P	N	7	0	

SUBSTITUTE SHEET

Fig. 8

Fig. 8a

Fig. 8b

Fig.8a

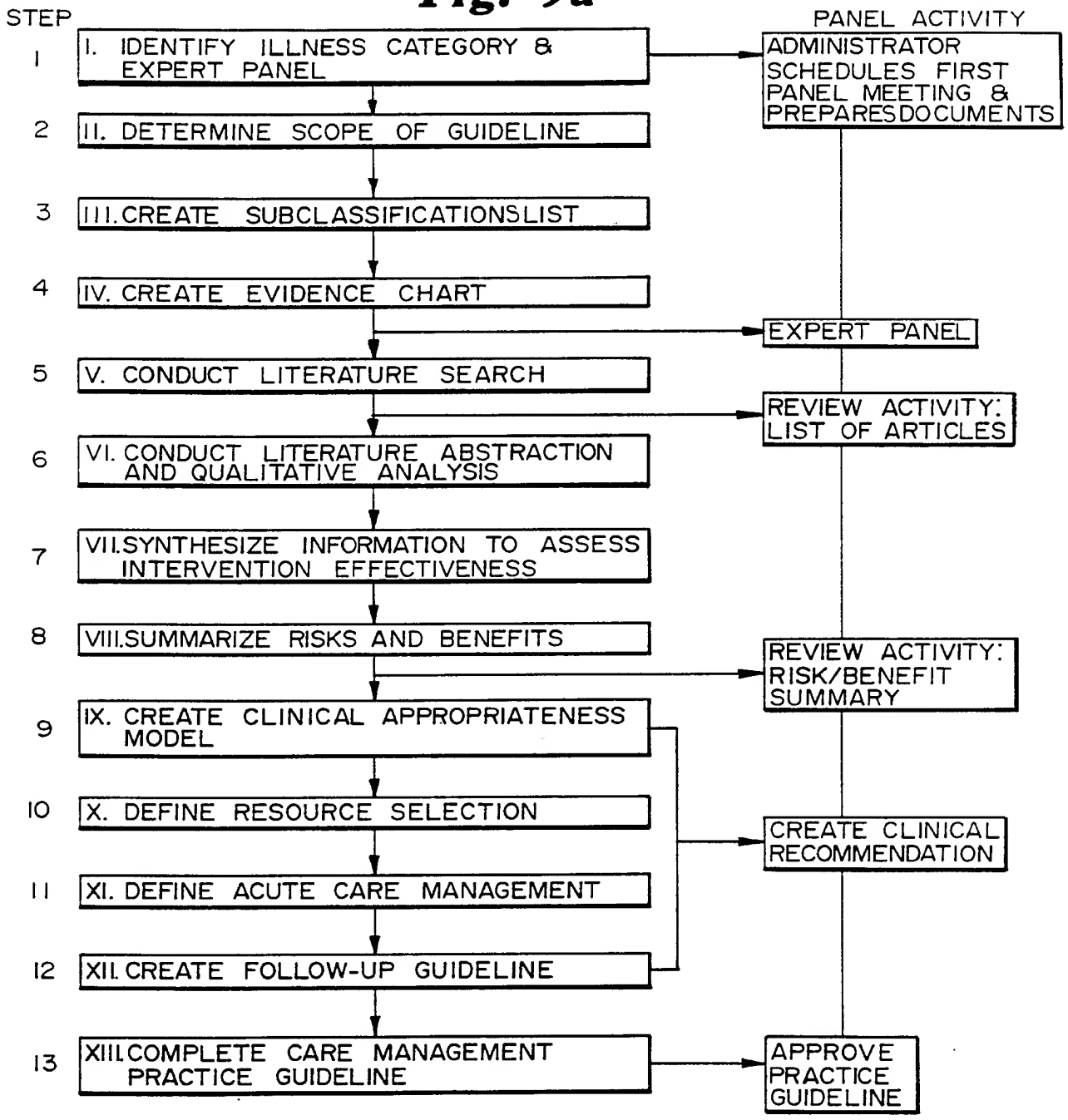
34	35 SETTING	36 LOS	37 PREOP LOS	38 A/S	39 FLAG	40 LINE NUM	41 CPT VERBAGE
C0001	1P	4	0	N		02	WITHOUT OXYGEN
C0001C	1P	7	0	N	*	01	(*IF AIDS REFER CCM)
C0002	1P	7	0	N	CCM	01	PARENTERAL ANTIBIOTIC WITH VENTILATOR
C0003	1P	4	0	N		01	INHALED BETA AGONISTS WITH SYSTEMIC
						02	STERIODS (IV OR PO) OF >40 MG PREDNISONE
						03	OR EQUIVALENT PER DAY WITH OR WITHOUT
						04	THEOPHYLLINES WITH OR WITHOUT
						05	ANTICHOLINERGICS
C0003C	1P	4	0	N	CCM	01	ON VENTILATOR
C0004	1P	6	0	N	CCM	01	PARENTERAL MEDICATIONS WITH OR WITHOUT
						02	OXYGEN
C0005	1P	7	0	N		01	IV HEPARIN AND COUMADIN (COUMADIN MUST
						02	BE INITIATED BY AT LEAST DAY 2 OF
						03	HEPARINIZATION)
C0006	0P	0	0	N		01	ANTIPLATELET/ANTICOAGULANT MEDICAL
						02	MANAGEMENT
C0007	1P	9	0	N		01	STREPTOKINASE OR UROKINASE FOR 3 DAYS
						02	FOLLOWED BY 6 DAYS HEPARIN WITH
						03	COUMADIN INITIATED BY DAY 2 OF
						04	HEPARINIZATION
C0008	1P	7	0	N		01	BED REST, WITH OR WITHOUT ANTIBIOTICS,
						02	WITH OR WITHOUT ANTICOAGULANTS, WITH OR
						03	WITHOUT NSAID'S
C0009	0P	0	0	N		01	STABILIZE CLINICAL CONDITION, IF
						02	POSSIBLE, PRIOR TO FURTHER CARDIAC

SUBSTITUTE SHEET

Fig.8b

					03	EVALUATION	
C0010	OP	0	0	N	01	MEDICAL MANAGEMENT	
C0011	1P	7	0	N	01	CCU WITH TELEMETRY	
C0011C	1P	10	0	N	01	WITH CC	
C0012	1P	7	0	N	01	STREPTOKINASE OR TPA	
C0013	1P	3	0	N	01	CCU WITH TELEMETRY AND MEDICATION REGULATION	
					02		
C0014	OP	0	0	N	01	ANTIBIOTICS, ORAL	
C0015	1P	3	0	N	01	TELEMETRY WITH CARDIAC MEDICATION	
C0016	1P	2	0	N	01	TELEMETRY, SERIAL IKGS AND ENZYMES	
C0016C	1P	3	0	N	01	WITH ANGINAL EQUIVALENT	
C0017	OP	0	0	N	01	EXERCISE THALLIUM OR TECHNETIUM SCAN	
C0018	OP	0	0	N	01	ADENOSINE OR PERSANTINE SCAN IF AVAIL- ABLE	
					02		
C0019	OP	0	0	N	01	ANTIBIOTICS, REST, HOT PACKS AND/OR NSAID'S	
					02		
C0020	OP	0	0	N	01	EXERCISE STRESS TEST	
C0021	1P	3	0	N	01	NG SUCTION	
C0022	1P	3	0	N	CCM 01	TPN	
C0023	1P	2	0	N	01	OBSERVATION	
					02	WITH OR WITHOUT IV	
					03	ANTIBIOTICS, WITH OR WITHOUT IV FLUIDS	
					04	WITH OR WITHOUT INVESTIGATIONAL STUDIES	
C0024	1P	2	0	N	01	IV ANTIBIOTICS, WITH OR WITHOUT DAILY DRESSING CHANGES	
					02		
C0025	1P	2	0	N	01	IM ANALGESICS >=q4h OR IV ANALGESICS	

Fig. 9a


STEP
PANEL ACTIVITY
1
I. IDENTIFY ILLNESS CATEGORY & EXPERT PANEL
ADMINISTRATOR SCHEDULES FIRST PANEL MEETING & PREPARES DOCUMENTS
2
II. DETERMINE SCOPE OF GUIDELINE
3
III. CREATE SUBCLASSIFICATIONS LIST
4
IV. CREATE EVIDENCE CHART
EXPERT PANEL
5
V. CONDUCT LITERATURE SEARCH
REVIEW ACTIVITY: LIST OF ARTICLES
6
VI. CONDUCT LITERATURE ABSTRACTION AND QUALITATIVE ANALYSIS
7
VII. SYNTHESIZE INFORMATION TO ASSESS INTERVENTION EFFECTIVENESS
8
VIII. SUMMARIZE RISKS AND BENEFITS
REVIEW ACTIVITY: RISK/BENEFIT SUMMARY
9
IX. CREATE CLINICAL APPROPRIATENESS MODEL
10
X. DEFINE RESOURCE SELECTION
CREATE CLINICAL RECOMMENDATION
11
XI. DEFINE ACUTE CARE MANAGEMENT
12
XII. CREATE FOLLOW-UP GUIDELINE
13
XIII. COMPLETE CARE MANAGEMENT PRACTICE GUIDELINE
APPROVE PRACTICE GUIDELINE

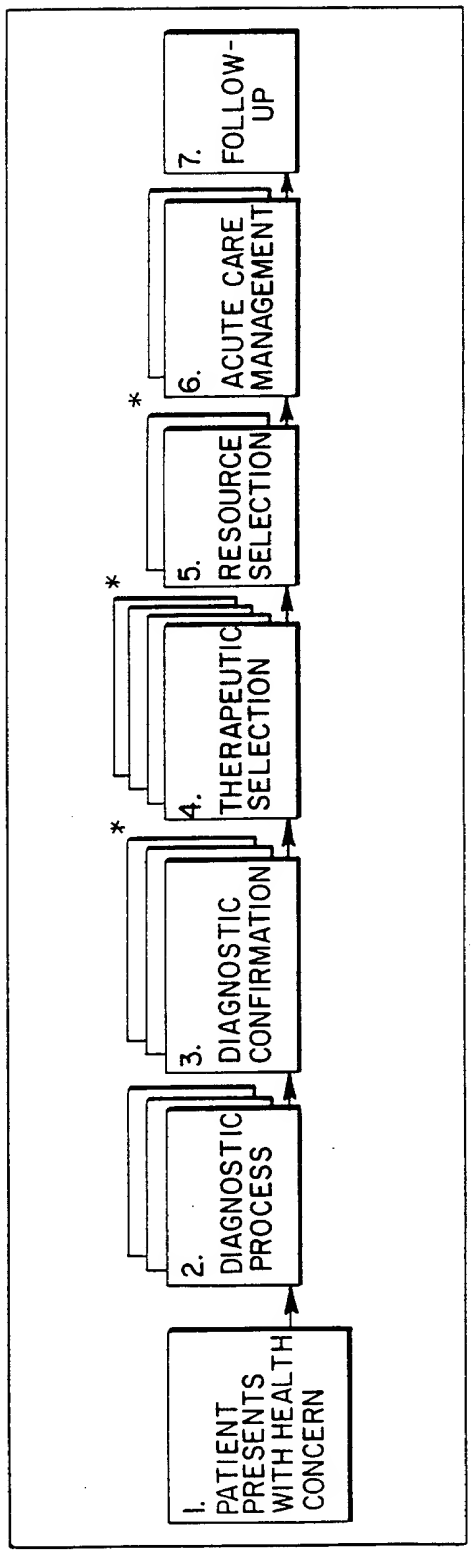

1. PATIENT PRESENTS WITH HEALTH CONCERN
2. DIAGNOSTIC PROCESS
3. DIAGNOSTIC CONFIRMATION
4. THERAPEUTIC SELECTION
5. RESOURCE SELECTION
6. ACUTE CARE MANAGEMENT
7. FOLLOW-UP
*
*
*

Fig. 9b

Fig.10

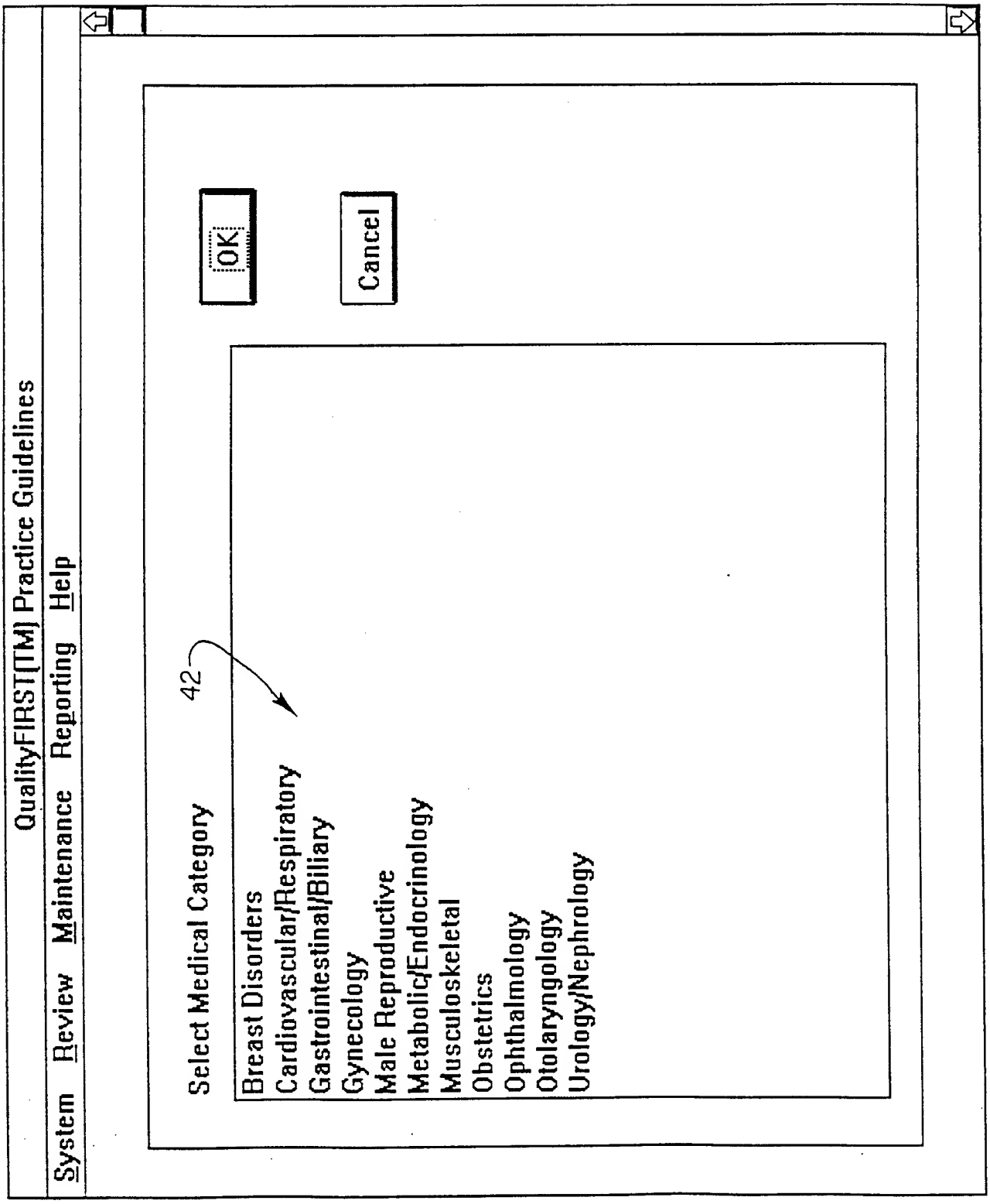

QualityFIRST[TM] Practice Guidelines
System Review Maintenance Reporting Help
Select Medical Category
42
Breast Disorders
Cardiovascular/Respiratory
Gastrointestinal/Biliary
Gynecology
Male Reproductive
Metabolic/Endocrinology
Musculoskeletal
Obstetrics
Ophthalmology
Otolaryngology
Urology/Nephrology
OK
Cancel

Fig.11

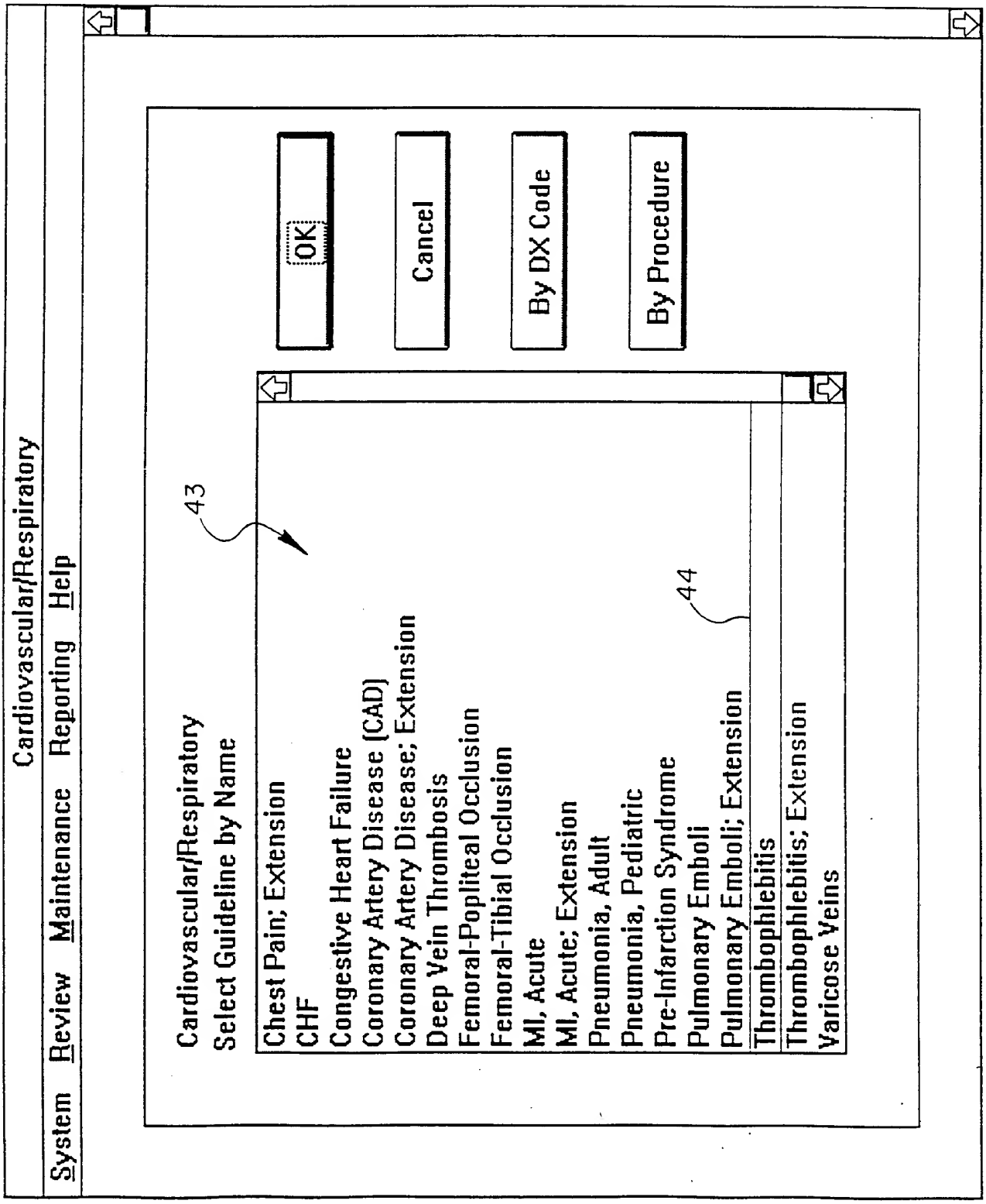

Cardiovascular/Respiratory
System Review Maintenance Reporting Help
Cardiovascular/Respiratory
Select Guideline by Name
43
Chest Pain; Extension
CHF
Congestive Heart Failure
Coronary Artery Disease (CAD)
Coronary Artery Disease; Extension
Deep Vein Thrombosis
Femoral-Popliteal Occlusion
Femoral-Tibial Occlusion
MI, Acute
MI, Acute; Extension
Pneumonia, Adult
Pneumonia, Pediatric
Pre-Infarction Syndrome
Pulmonary Emboli
Pulmonary Emboli; Extension
Thrombophlebitis
Thrombophlebitis; Extension
Varicose Veins
44
OK
Cancel
By DX Code
By Procedure

Fig.12

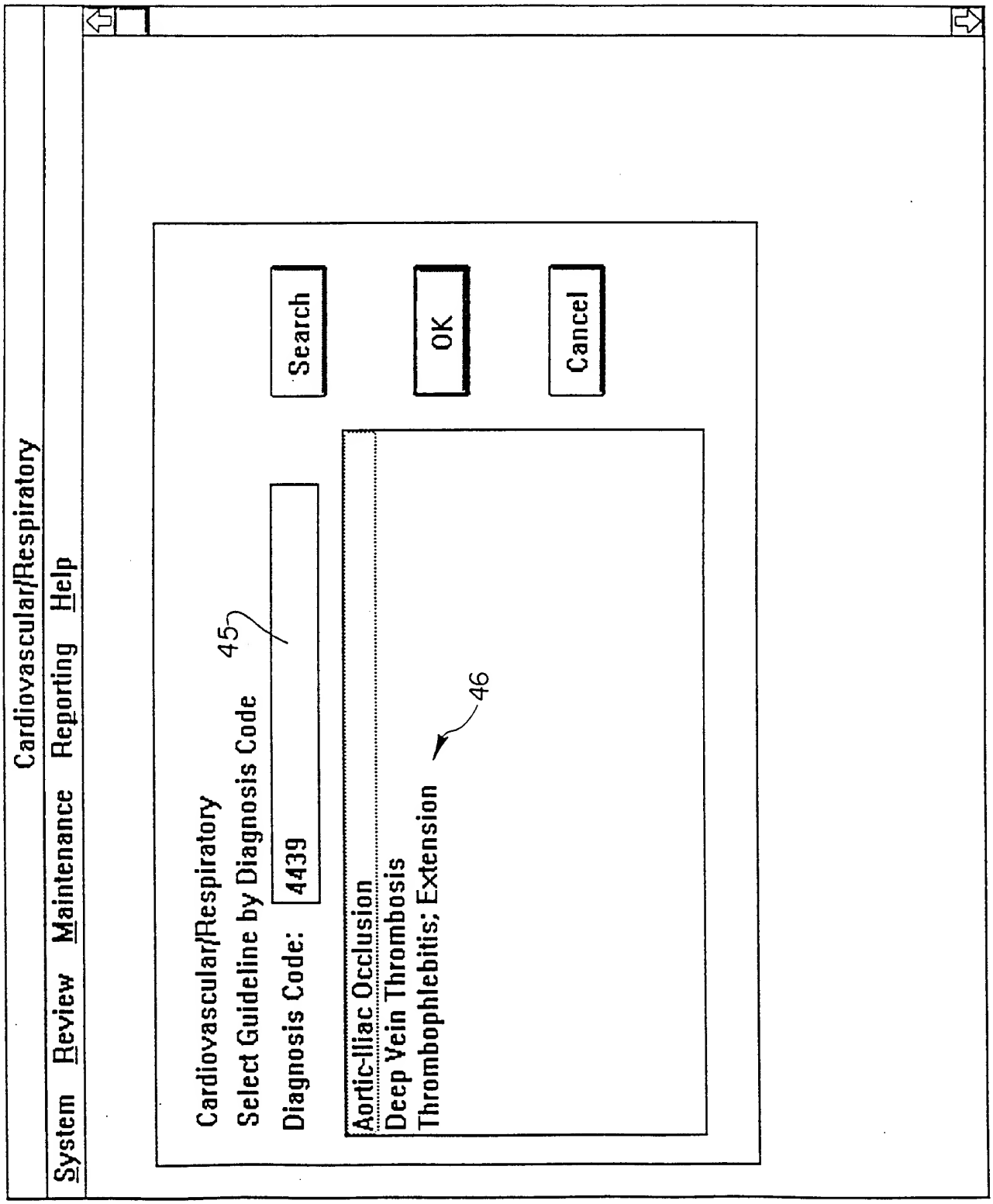

Cardiovascular/Respiratory
System Review Maintenance Reporting Help
Cardiovascular/Respiratory
Select Guideline by Diagnosis Code
45
Diagnosis Code: 4439
Search
OK
Cancel
Aortic-Iliac Occlusion
Deep Vein Thrombosis
Thrombophlebitis; Extension
46

Fig.12b

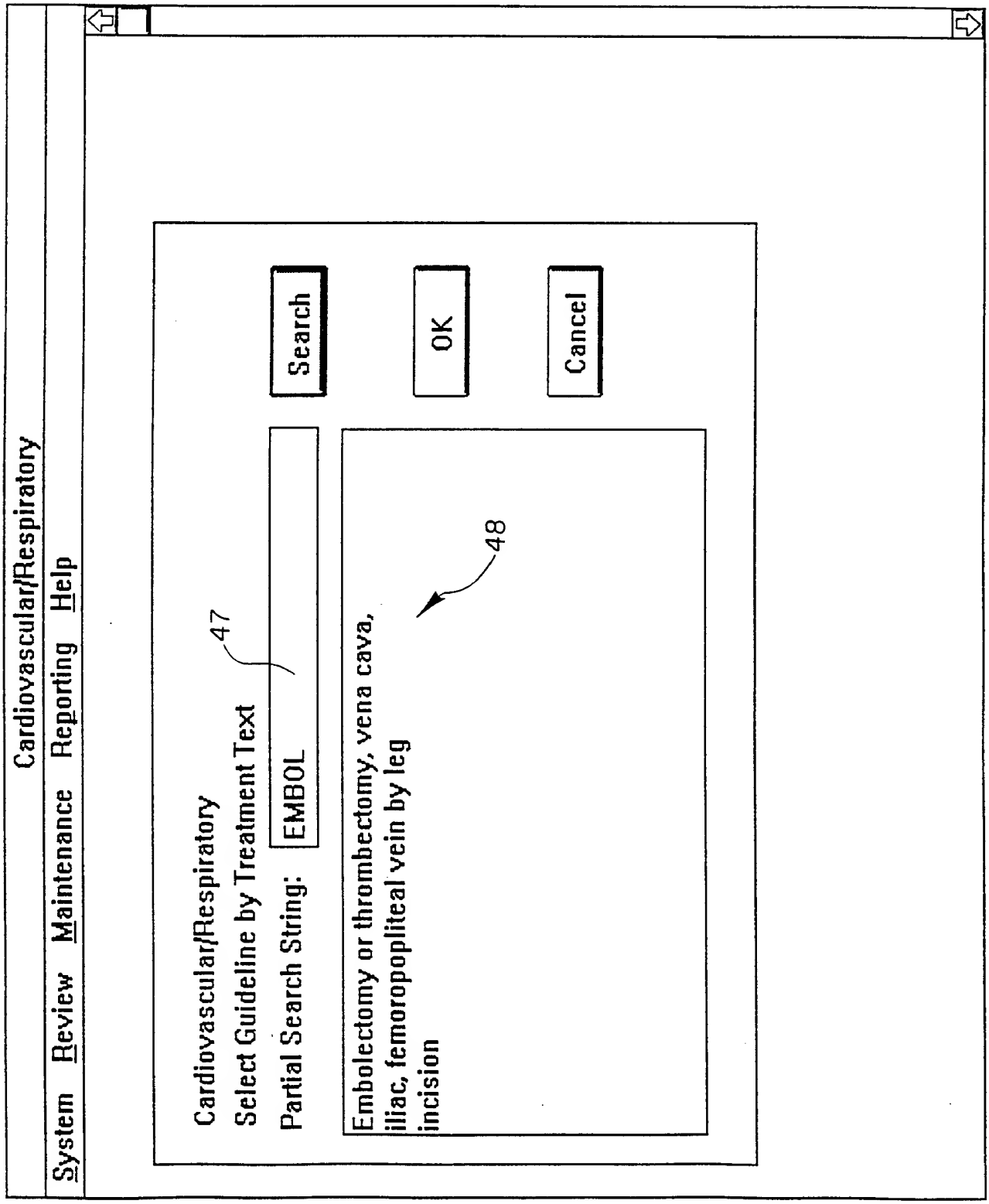

Cardiovascular/Respiratory
System Review Maintenance Reporting Help
Cardiovascular/Respiratory
Select Guideline by Treatment Text
Partial Search String:
EMBOL
47
Search
OK
Cancel
48
Embolectomy or thrombectomy, vena cava, iliac, femoropopliteal vein by leg incision

Fig.13

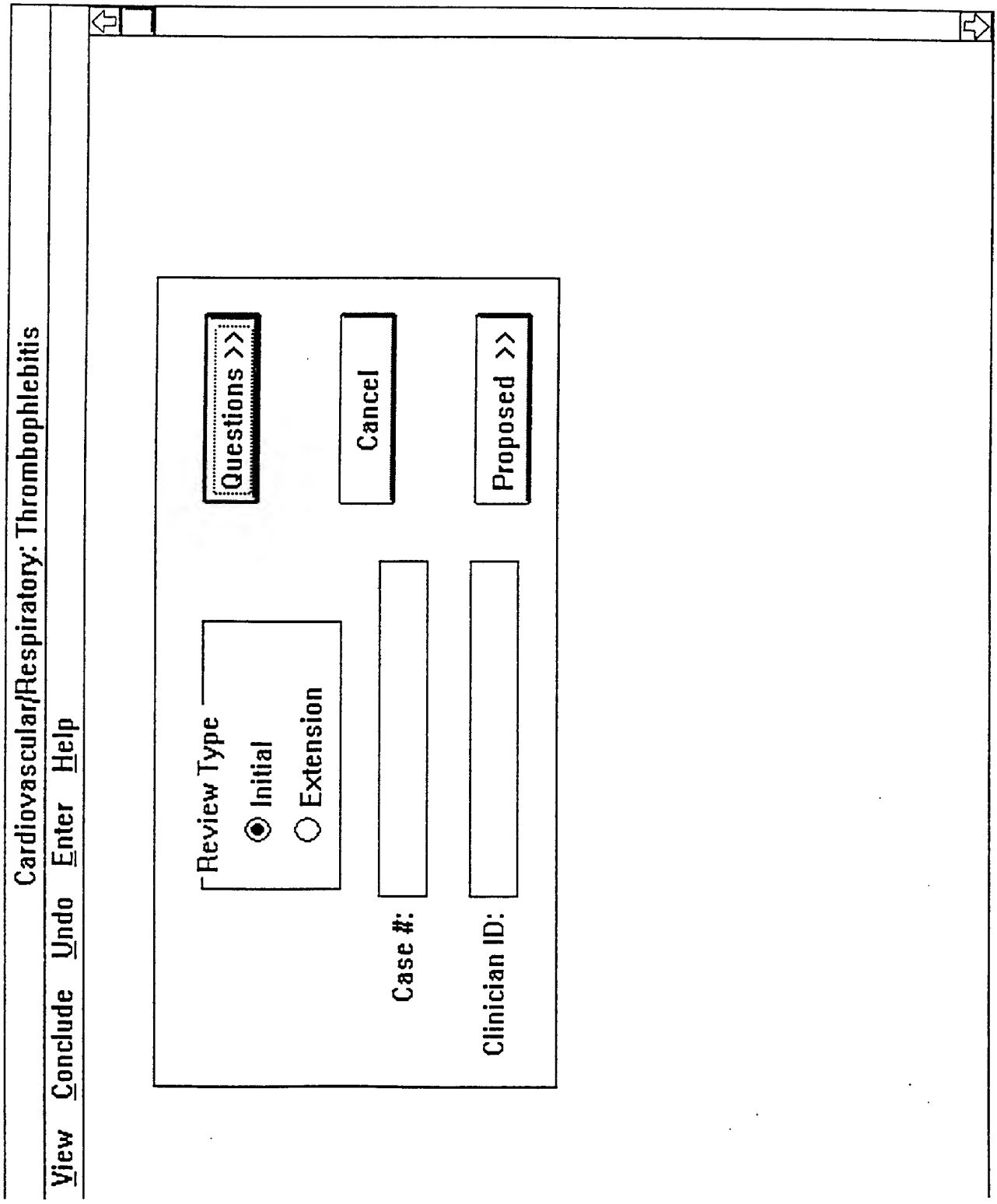

Cardiovascular/Respiratory: Thrombophlebitis
View Conclude Undo Enter Help
Review Type
Initial
Extension
Questions >>
Cancel
Proposed >>
Case #:
Clinician ID:

Fig.14

Cardiovascular/Respiratory: Thrombophlebitis

View Conclude Undo Enter Help

Initial Review, Case not yet entered

50

1 Deep vein thrombosis diagnosed on doppler/venogram [Pass] [Fail] P/F

2 Superficial thrombophlebitis diagnosed by exam and one of the following: No Selection

(a) pain

(b) redness

(c) swelling

(d) none of the above

3 Is there proximal embolization? P/F

4 Anticoagulation therapy contraindicated due to: No Selection

(a) sensitivity to heparin

(b) GI or intracerebral bleed

(c) patient has CA or especially metastatic CA

Fig.15

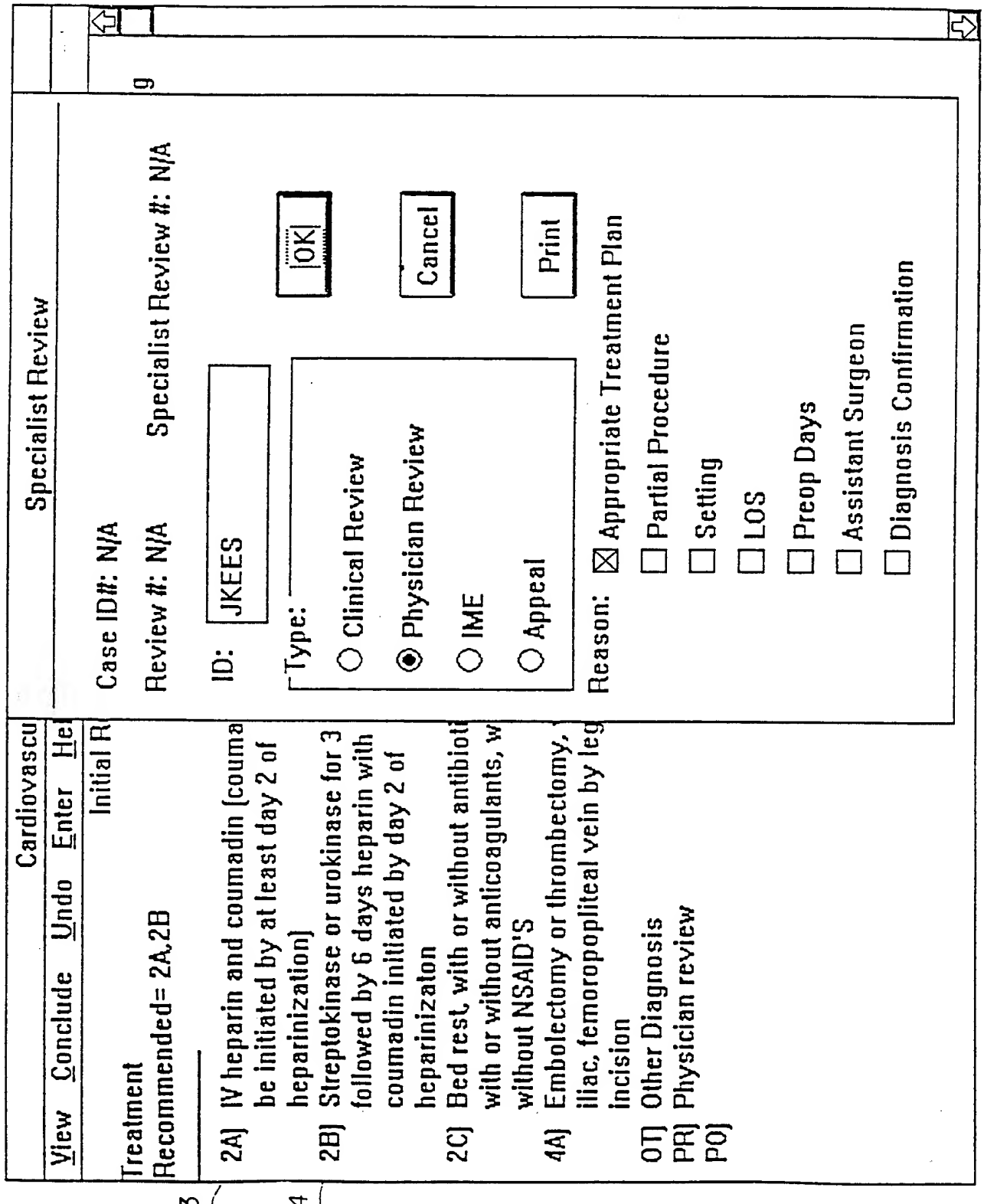

Cardiovascu
View Conclude Undo Enter He
Initial R
Treatment
Recommended= 2A,2B
2A] IV heparin and coumadin (couma
be initiated by at least day 2 of
heparinization)
2B] Streptokinase or urokinase for 3
followed by 6 days heparin with
coumadin initiated by day 2 of
heparinizaton
2C] Bed rest, with or without antibiot
with or without anticoagulants, w
without NSAID'S
4A] Embolectomy or thrombectomy,
iliac, femoropopliteal vein by leg
incision
OT] Other Diagnosis
PR] Physician review
PO]
53
54
Specialist Review
Case ID#: N/A
Review #: N/A
Specialist Review #: N/A
ID: JKEES
Type:
Clinical Review
Physician Review
IME
Appeal
OK
Cancel
Print
Reason:
Appropriate Treatment Plan
Partial Procedure
Setting
LOS
Preop Days
Assistant Surgeon
Diagnosis Confirmation

Fig.16

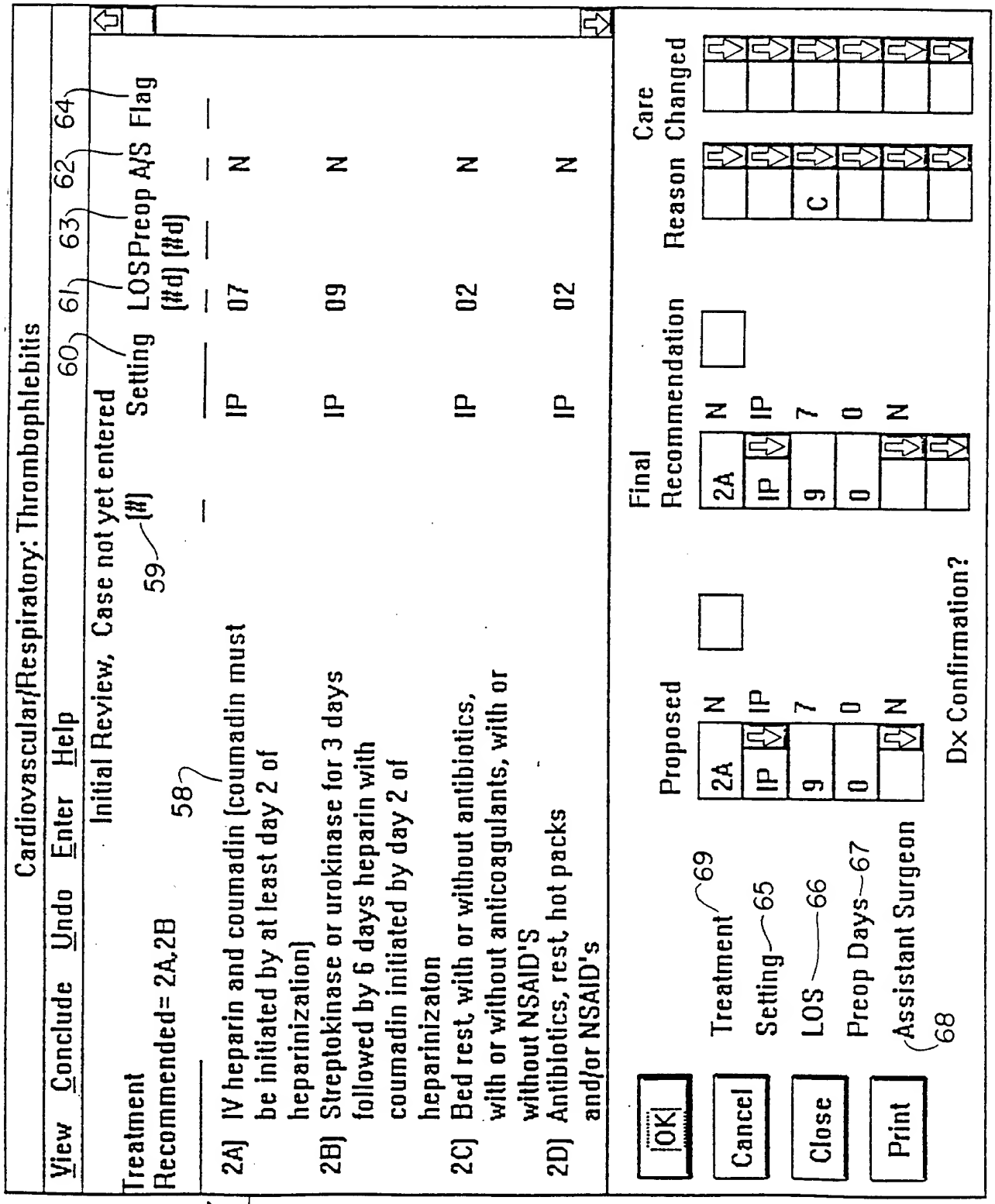

Cardiovascular/Respiratory: Thrombophlebitis
View Conclude Undo Enter Help
Initial Review, Case not yet entered
Treatment Recommended= 2A,2B
59
(#)
60
Setting
61
LOS (#d)
63
Preop (#d)
62
A/S
64
Flag
57
58
2A) IV heparin and coumadin (coumadin must be initiated by at least day 2 of heparinization)
IP 07 N
2B) Streptokinase or urokinase for 3 days followed by 6 days heparin with coumadin initiated by day 2 of heparinizaton
IP 09 N
2C) Bed rest, with or without antibiotics, with or without anticoagulants, with or without NSAID'S
IP 02 N
2D) Antiblotics, rest, hot packs and/or NSAID's
IP 02 N
OK
Cancel
Close
Print
Proposed
Treatment 69
Setting 65
LOS 66
Preop Days 67
Assistant Surgeon 68
2A N
IP IP
7 7
0 0
N N
Dx Confirmation?
Final Recommendation
2A N
IP IP
7
0
Care Reason Changed
C

Fig.17

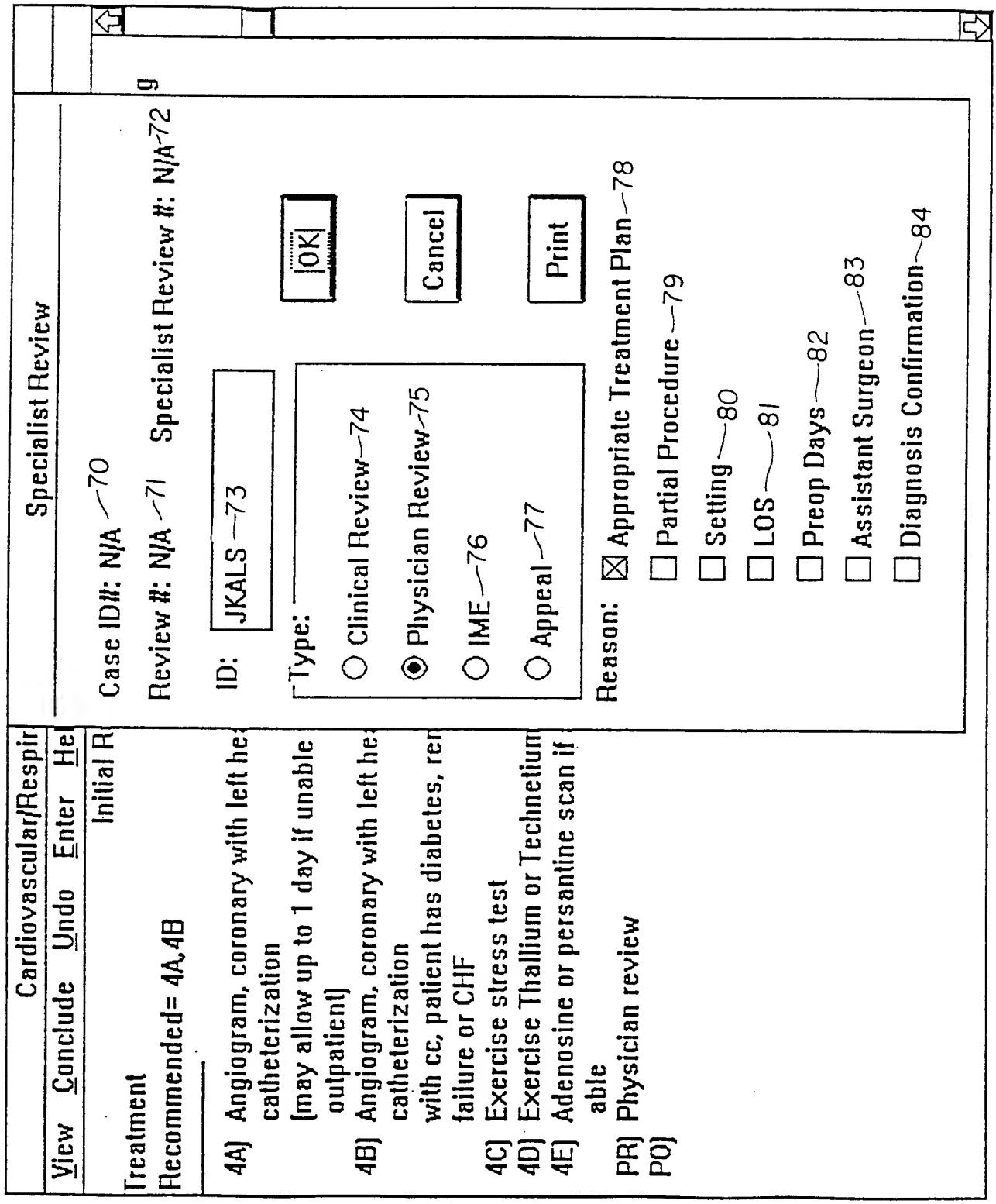
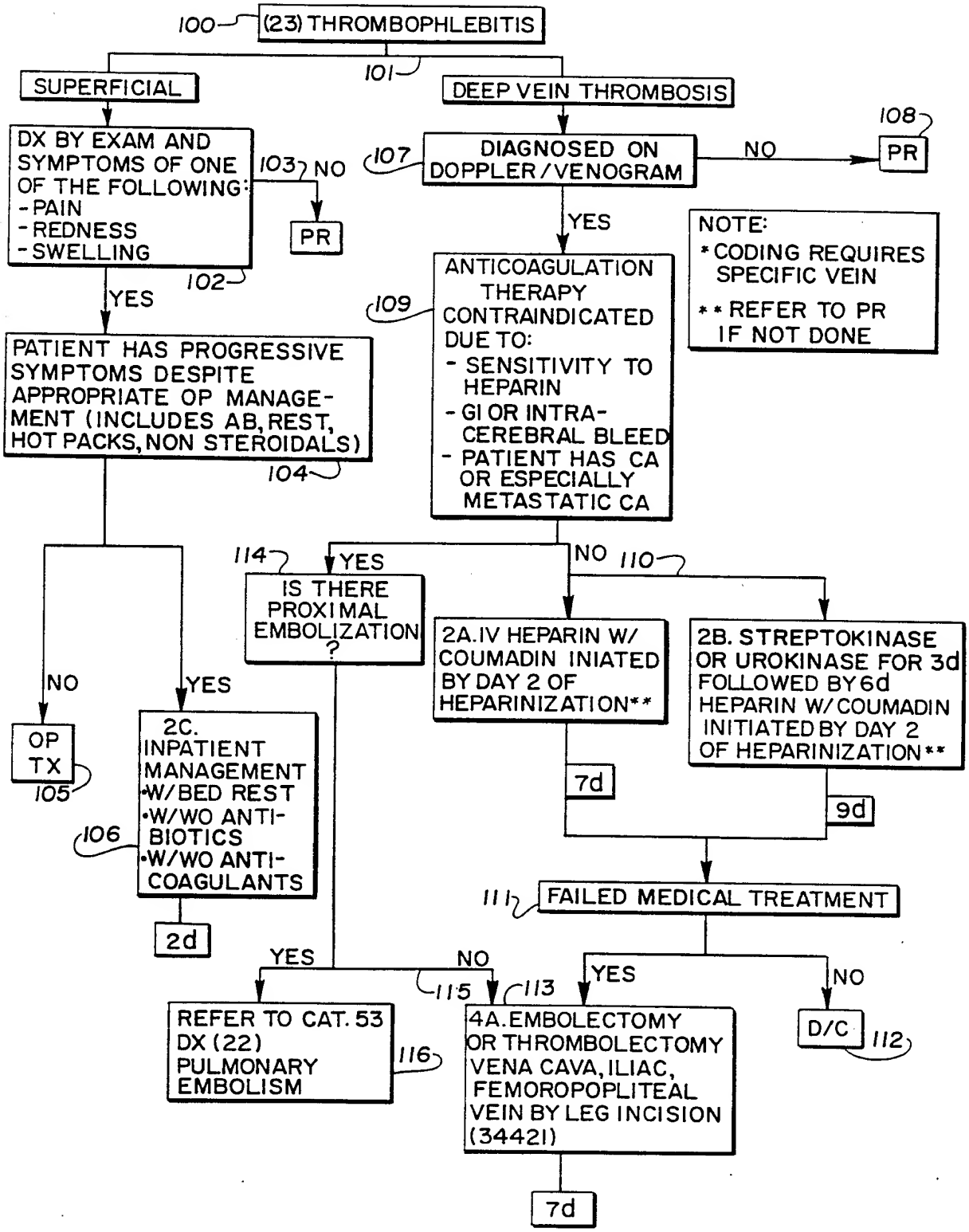

Cardiovascular/Respir
View Conclude Undo Enter He
Initial R
Treatment Recommended= 4A,4B
4A) Angiogram, coronary with left he catheterization (may allow up to 1 day if unable outpatient)
4B) Angiogram, coronary with left he catheterization with cc, patient has diabetes, re failure or CHF
4C) Exercise stress test
4D) Exercise Thallium or Technetium
4E) Adenosine or persantine scan if able
PR) Physician review
PO)
Specialist Review
Case ID#: N/A 70
Review #: N/A 71
Specialist Review #: N/A 72
ID: JKALS 73
Type:
Clinical Review 74
Physician Review 75
IME 76
Appeal 77
OK
Cancel
Print
Reason:
Appropriate Treatment Plan 78
Partial Procedure 79
Setting 80
LOS 81
Preop Days 82
Assistant Surgeon 83
Diagnosis Confirmation 84

Fig. 18


100
(23) THROMBOPHLEBITIS
101
SUPERFICIAL
DEEP VEIN THROMBOSIS
DX BY EXAM AND SYMPTOMS OF ONE OF THE FOLLOWING:
- PAIN
- REDNESS
- SWELLING
102
103
NO
PR
YES
PATIENT HAS PROGRESSIVE SYMPTOMS DESPITE APPROPRIATE OP MANAGEMENT (INCLUDES AB, REST, HOT PACKS, NON STEROIDALS)
104
107
DIAGNOSED ON DOPPLER/VENOGRAM
NO
108
PR
YES
NOTE:
* CODING REQUIRES SPECIFIC VEIN
** REFER TO PR IF NOT DONE
109
ANTICOAGULATION THERAPY CONTRAINDICATED DUE TO:
- SENSITIVITY TO HEPARIN
- GI OR INTRACEREBRAL BLEED
- PATIENT HAS CA OR ESPECIALLY METASTATIC CA
NO
110
YES
114
IS THERE PROXIMAL EMBOLIZATION ?
NO
YES
OP TX
105
2C. INPATIENT MANAGEMENT
•W/BED REST
•W/WO ANTIBIOTICS
•W/WO ANTICOAGULANTS
106
2d
2A. IV HEPARIN W/ COUMADIN INIATED BY DAY 2 OF HEPARINIZATION**
7d
2B. STREPTOKINASE OR UROKINASE FOR 3d FOLLOWED BY 6d HEPARIN W/ COUMADIN INITIATED BY DAY 2 OF HEPARINIZATION**
9d
111
FAILED MEDICAL TREATMENT
YES
NO
115
113
YES
NO
REFER TO CAT. 53 DX (22) PULMONARY EMBOLISM
116
4A. EMBOLECTOMY OR THROMBOLECTOMY VENA CAVA, ILIAC, FEMOROPOPLITEAL VEIN BY LEG INCISION (34421)
D/C
112
7d

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US93/06104

A. CLASSIFICATION OF SUBJECT MATTER

IPC(5) :G06F, 15/00
US CL :364/413.02
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 364/413.02; 395/50, 75

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

Please See Extra Sheet.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US, A, 4,290,114 (Sinay) 15 September 1981, abstract.	6-8 and 26-28
A	US, A, 4,315,309 (Coli) 9 February 1982, see entire document.	1-39
Y	US, A, 4,489,387 (Lamb et al.) 18 December 1984, entire document.	1, 3, 4, 9, 12, 15, 19-21, 23, 24, 29, 32, 35 and 39
A	US, A, 4,667,292 (Mohlenbrock et al) 19 May 1987, see entire document.	1-39

[X] Further documents are listed in the continuation of Box C. [ ] See patent family annex.

*	Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A"	document defining the general state of the art which is not considered to be part of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E"	earlier document published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&"	document member of the same patent family
"O"	document referring to an oral disclosure, use, exhibition or other means		
"P"	document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search 18 AUGUST 1993	Date of mailing of the international search report OCT 05 1993
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. NOT APPLICABLE	Authorized officer LAURA BRUTMAN Telephone No. (703) 305-9771

Form PCT/ISA/210 (second sheet)(July 1992)*

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US93/06104

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US, A, 4,731,725 (Suto et al) 15 March 1988, see entire document.	1, 3, 4, 6-9, 12, 15, 19-21, 23, 24, 26-29, 32, 35, 39
Y	US, A, 4,733,354 (Potter et al) 22 March 1988, see entire document.	1, 3, 4, 6-9, 12, 15, 19-21, 23, 24, 26-29, 32, 35, 39
Y	US, A, 4,839,822 (Dormond et al) 13 June 1989, see entire document.	1, 3, 4, 6-9, 12, 15, 19-21, 23, 24, 26-29, 32, 35, 39
Y	US, A, 4,945,476 (Bodick et al) 31 June 1990, see entire document.	1, 3, 4, 6-9, 12, 15, 19-21, 23, 24, 26-29, 32, 35, 39

B. FIELDS SEARCHED
Electronic data bases consulted (Name of data base and where practicable terms used):

APS
search terms: expert system#, modify, compar?, conditional branching, medical, health, diagnos?, health care, medical diagnosis